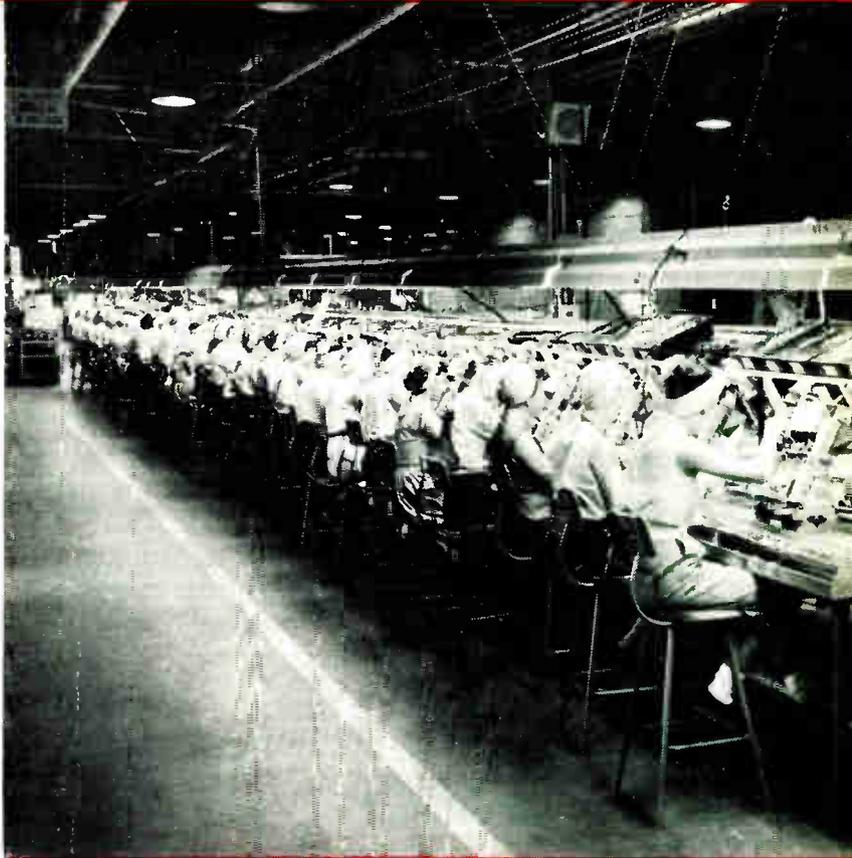


# **ELECTRONICS** *and* **COMMUNICATIONS**

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- **American Export Market For Canadian Made Components.**
- **Automatic Broadcasting Equipment Reduces Programming Costs.**
- **Cable System Testing Tool Saves \$15,000 Annually.**
- **Electronic Instruments Provide Valuable Stepping Stone From Textile Industry Doldrums.**



The phenomenal growth of a relatively new industry is evident in this view of the main television assembly line at the Canadian Westinghouse Company's new Branford plant. A sequence of minutely-timed operations permits each operator to complete her phase of the assembly job, while the line moves automatically at regular intervals.

*Jan. - Feb.* 1955 ★ \$5.00 a year  
An AGE Publication, Toronto, Canada

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### FOR automatic emergency supply of AC power *Lenkurt* type 5060A and 5070A

Lenkurt Type 5060A and Type 5070A emergency a-c power supply panels furnish up to 250 watts of a-c power from storage batteries. Operation is automatic upon failure of the normal a-c power.

These emergency power supplies are particularly suitable for communications applications. They are designed to meet a wide range of applications where a-c operated equipment at attended or unattended locations cannot be interrupted for even short intervals. The rated load capacity is ample to assure uninterrupted operation of a complete carrier terminal (such as a Lenkurt Type 33A three-channel assembly), a carrier repeater, a small radio station, or similar equipment.

Either existing telephone battery plant or automobile type storage batteries can furnish the necessary power source for emergency operation. An automatic battery charger can be used in conjunction with the batteries at unattended installations.

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- **Fast**—Full load is taken within 0.5 seconds after transfer is initiated.
- **Automatic**—Normal a-c power source is monitored so transfer is initiated automatically whenever the normal source drops below about 60 volts.
- **Convenient**—Arranged for mounting on standard 19" relay rack, the panel also can be adapted for wall mounting if desired.
- **Minimum Maintenance**—Simple design uses only three relays and a dependable rotary converter.
- **24 or 48 Volt Battery**—Type 5060A operates from 48-volt telephone battery. Type 5070A operates from 24-volt telephone or automobile type storage batteries.
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- **Load Adjustment**—Dropping resistors can be strapped to accommodate loads less than 250 watts.

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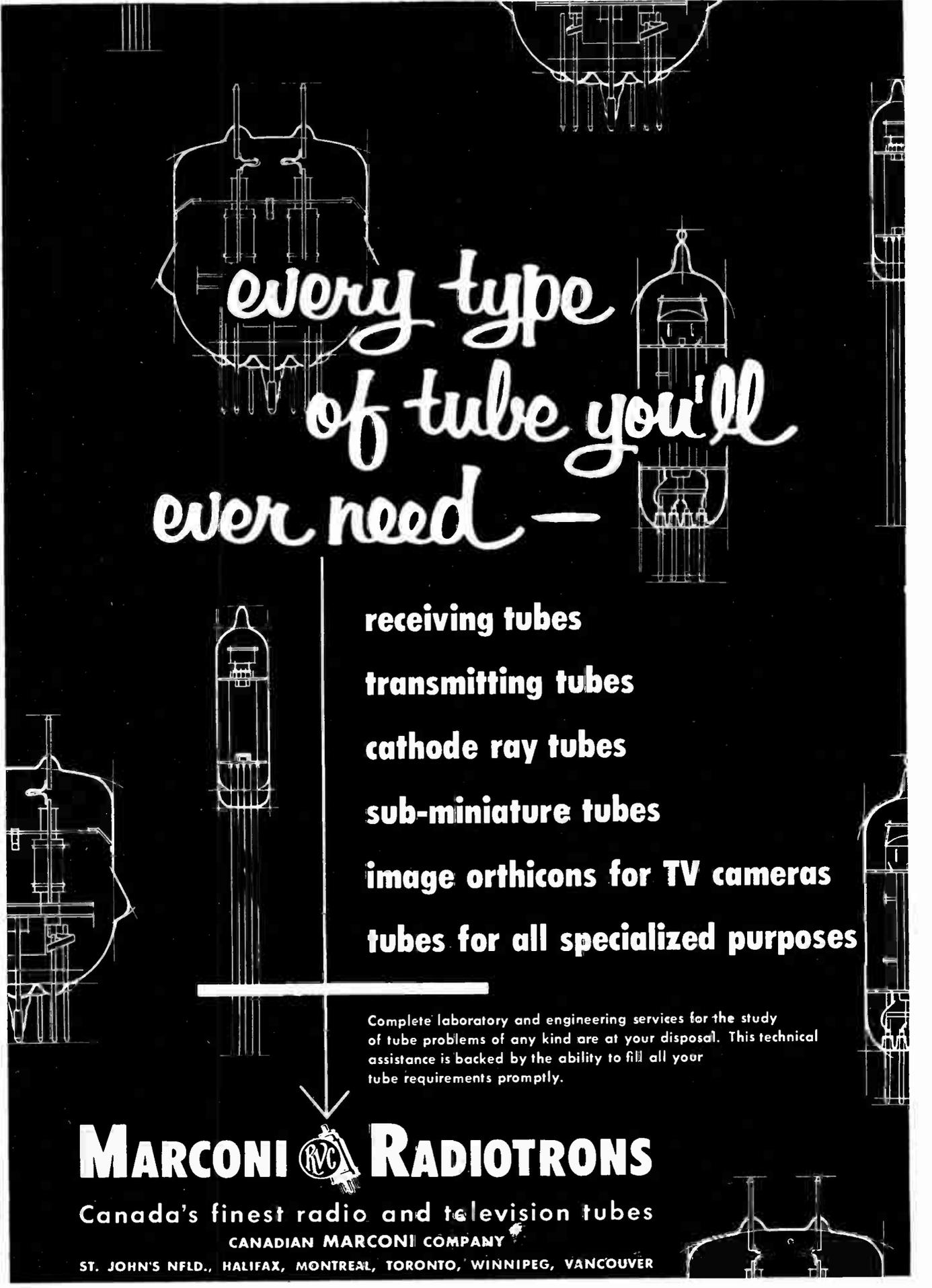
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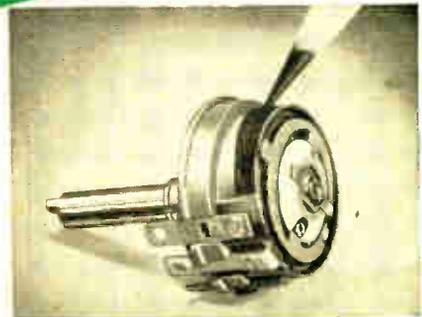
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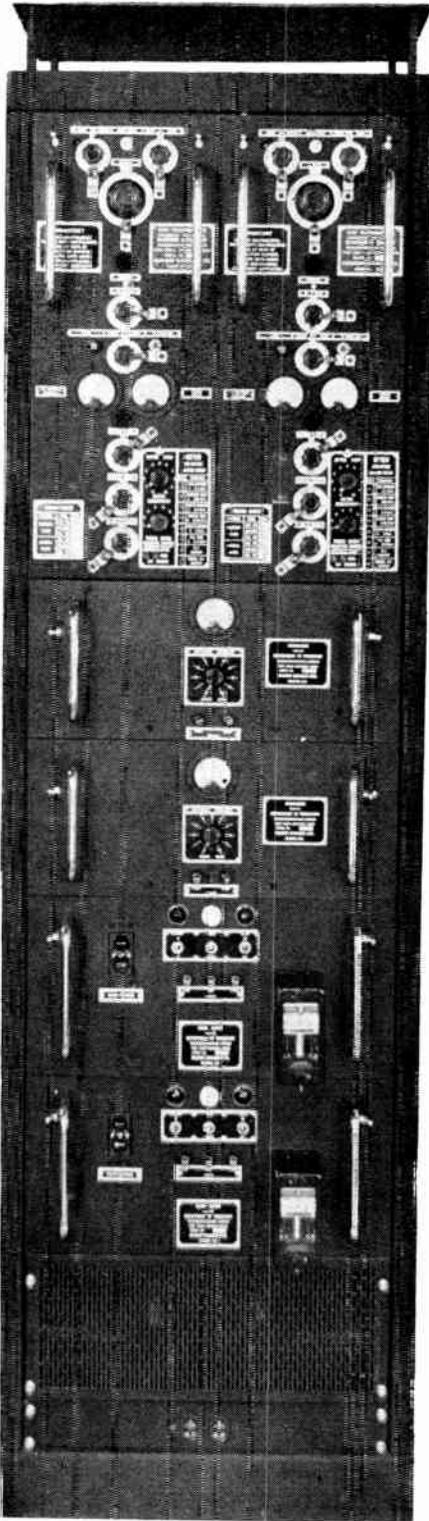
Controls & Resistors

For more data on advertised products, use coupon, page 67

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MODEL 7520c

Meets Dept. of Transport, C.A.A. and I.T.U. specifications. Also available in Single Channel equipment.

## Technical data

- **Performance** . . . . . Continuous operation under the following conditions:  
Ambient Temperature —10 deg. C. to +50 deg. C.  
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Line Voltage 105V to 130V.  
Line Frequency 60 CPS.
  - **Channels** . . . . . Two separate crystal controlled channels per dual transmitter.
  - **Output** . . . . . At least 60 watts carrier at all frequencies between 108 mc/s and 153 mc/s.
  - **Frequency Coverage** . . . . . 108 to 153 mc/s in two bands  
108—135 mc/s.  
selected by tap changing  
125—153 mc/s.
- Note:** Other models available to cover frequencies between 20 mc/s and 108 mc/s.
- **Frequency Stability** . . . . . +.005% over service conditions of ambient temperature and relative humidity.
  - **Modulation** . . . . . Amplitude modulation up to 90%.
  - **Audio Response** . . . . . Better than 1 db from 300 CPS to 4,000 CPS.
  - **Audio Distortion** . . . . . Less than 6% in the demodulated carrier.
  - **Audio Input** . . . . . An input of —20 db below 6. mw. is sufficient to provide 90% modulation.
  - **Hum Distortion** . . . . . At least 50 db below 90% modulation.
  - **Carrier Harmonics** . . . . . At least 40 db below the carrier fundamental.
  - **Unwanted R.F. Output** . . . . . At least 80 db below the carrier level in the frequency range 200 kc/s to 400 mc/s.
  - **Audio Cross Modulation** . . . . . At least 60 db below 90% modulation.
  - **R.F. Cross Modulation** . . . . . At least 60 db below the carrier level.
  - **Antenna Requirements** . . . . . The transmitter is designed to feed an Omnidirectional circularly polarized antenna to D.O.T. specifications ARA-184.
  - **Power Requirements** . . . . . Less than 1600 watts at better than 90% power factor for a dual transmitter.
  - **Miscellaneous** . . . . . Size: 21 $\frac{3}{4}$ " wide 79 $\frac{3}{4}$ " high including dust cover.  
Size: 18 $\frac{1}{8}$ " deep 36 $\frac{3}{4}$ " deep with units extended.  
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- Simpson's roll chart service makes a new roll chart available each year and complimentary roll chart supplements are provided at regular intervals.

- and—the Simpson 1000 is as handsome as it is useful. Front panel is finished in non-glare grey hammerloid. Rich burgundy carrying case looks like expensive luggage. Comes complete with Operator's Manual.

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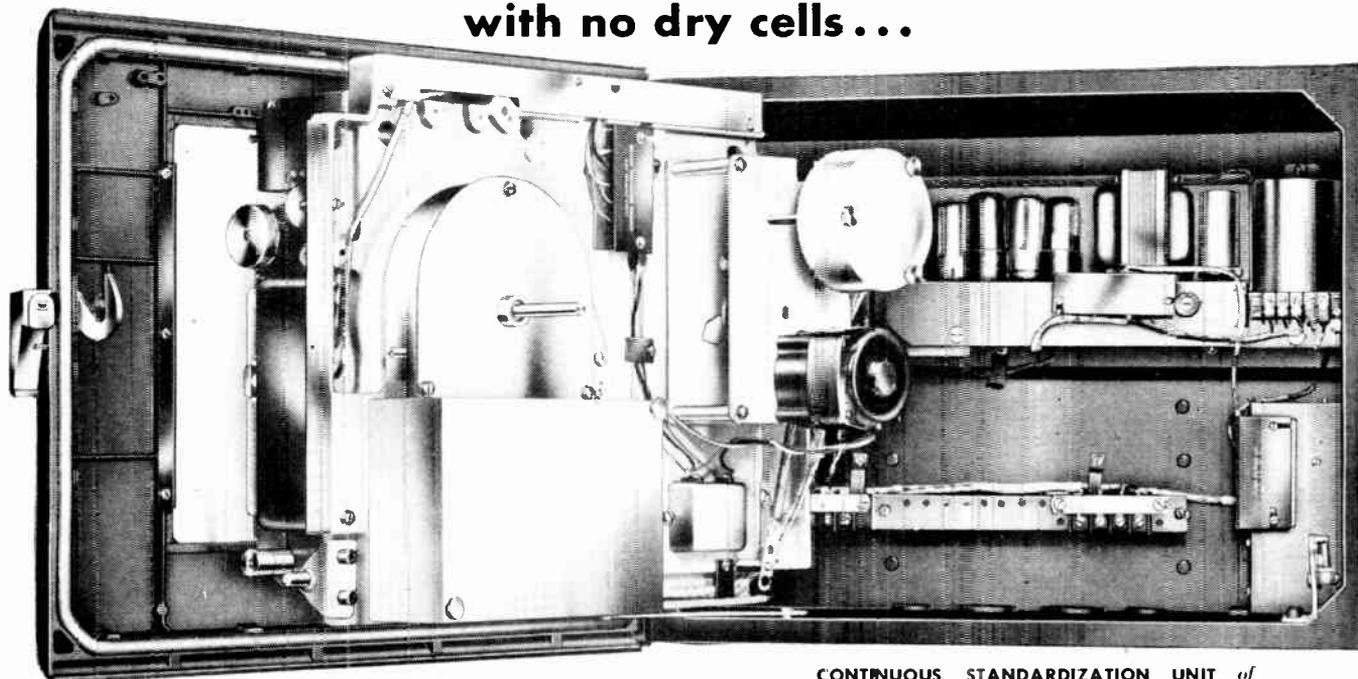
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For more data on advertised products, use coupon, page 67

# CONTINUOUS STANDARDIZATION

with no dry cells...



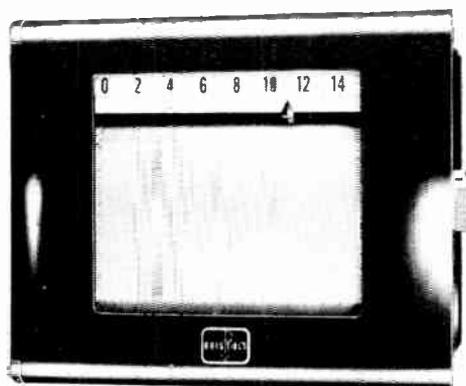
## **Bristol \*Dynamaster potentiometer pyrometers give you \*No-Batt continuous standardization**

You don't have to put up with interrupted performance from old-fashioned potentiometer pyrometers any longer!

When you use a Bristol thermocouple or radiation-type \*Dynamaster, you get a continuous record or control of temperatures up to 1000° F in any type of fuel-fired or electric furnace or heating equipment. Thanks to the exclusive \*No-Batt continuous standardization which eliminates the need for dry cells in these electronic instruments, Bristol has been able to do away with interruptions formerly required for periodic standardization.

Bristol electronic \*Dynamasters are made in round- and strip-chart, single- and multiple-record recorders, air-operated and electric controllers with all types of control actions. Two-pen and program control.

CONTINUOUS STANDARDIZATION UNIT of the electronic \*Dynamaster eliminates need for dry cells and standardizing mechanism. Result: no interruptions in the operation of the potentiometer for standardization; no batteries to replace.



BRISTOL \*DYNAMASTER CONTROLLERS in either the strip-chart model (shown above) or round-chart model, may be electrically or air operated. 2 position, 3 position, proportional, manual with automatic reset, or proportional input controls. On-off, proportional or reset air controls.

\*T.M. Registered.

The **BRISTOL**

Company of Canada Limited

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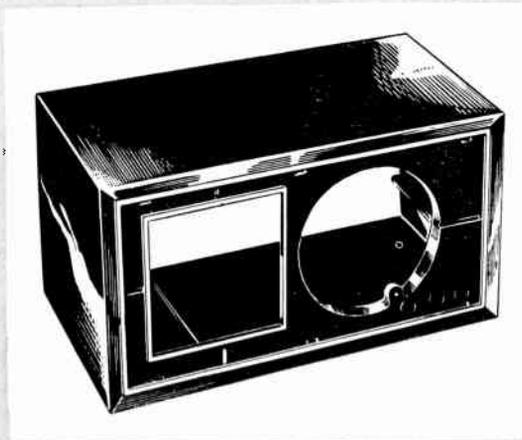
ELECTRONICS & COMMUNICATIONS, JANUARY - FEBRUARY, 1955

For more data on advertised products, use coupon, page 67

World Radio History



**Peter-Austin Magnajector**—moulded by Maple Leaf Plastics Ltd., Toronto, and designed by Sid Bersudsky & Associates, Toronto, in conjunction with Peter-Austin Engineers. This unit won the Canadian Plastics Achievement Award 1954 and the N.I.D.C. Award.



**Radio Cabinet**—moulded by Canadian General Electric, Cobourg, for Crosley Radio & Television Ltd., Toronto.



**Burglar Alarm Base and Cover**—moulded by Mack Molding Limited, Waterloo, Quebec, for Dominion Electric Protection Co., Toronto.

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APPEARANCE is one of the most important features in housings—that first look goes a long way to make or break your sale.

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# business briefs & trends

★ K. R. Patrick, president of Canadian Aviation Electronics, in a recent address to the Canadian Club of Grand'Mere, stated that the size of the electronics business in 10 years' time may reach \$2,000,000,000 yearly and employ in the neighborhood of 150,000 Canadians.

\* \* \*

★ Forty-eight companies are now licensed by the Western Electric Co. under Bell System patents to manufacture transistors, and about 600 concerns are licensed to produce specified electronic equipment, with the right to employ transistors. The Bell System holds basic patents on transistors and on circuits in which they may be used.

\* \* \*

★ Some indication of the attractiveness of scientific pursuits to Canadians is contained in a monthly bulletin of the National Research Council of Canada, which states that 6,600 people applied for jobs in the Council last year.

\* \* \*

★ According to reports, there were roughly 10,000 color television sets in use in the United States as of November, 1954. Color programs are being telecast over the networks for about eight hours each week.

\* \* \*

★ Eighteen rural telephone companies went out of business in 1953 and their operations have been taken over by the Bell Telephone Company of Canada.

\* \* \*

★ General Electric officials state that the greatest growth area of electronics in the next ten years will be the electronic mechanization of clerical work in offices. The application of electronics in this field will take over the accounting inventory control, material control, payrolls, purchasing, and other like services.

\* \* \*

★ R.C.A.'s General Sarnoff has predicted that by 1961 fifty per cent of the electronic industry will be made up of goods and services that do not now exist.

\* \* \*

★ Television, according to a recent report of the Canadian Association of Radio and Television Broadcasters, is not displacing radio from the Canadian home. A recent count showed that radios are still listened to in 96.4 per cent of Canadian homes.

\* \* \*

★ The Committee on Government Acts and Regulations of the R.T.M.A., under the chairmanship of W. H. Jeffrey, is preparing a brief for submission to the Canadian government requesting that the 15 per cent excise tax on radio and television receivers be removed.

\* \* \*

★ It is understood that the Radio Television Technicians' Association of Ontario will present a Bill to the Ontario Legislature, advocating the registration and regulation of television service technicians. A similar Bill designed to regulate TV service technicians in the city of New York is receiving considerable opposition from the American Radio Electronic Television Manufacturers' Association.

\* \* \*

★ The sale of television receivers provided the Federal Government with the third largest source of excise tax revenue during the fiscal year 1953-54. It amounted to \$11.7 million and ranked second only to cigarettes and tobacco and automobiles. Taxes collected from the sale of radios during the same period amounted to \$5 million.

★ "This new wonderful science of electronics could mean an opportunity for Canada to become a great industrial power, to build our nation on the selling of skills rather than our inventory. . . ." This, according to K. R. Patrick, president of Canadian Aviation Electronics, one of the leaders in the Canadian electronic field.

\* \* \*

★ Electronics have entered in to the refining of oils, and their use in this field gives promise of higher grade fuels. One proposed use is to take natural, or waste gases, and convert them into usable fuels.

\* \* \*

★ An experimental closed circuit TV system has been installed for the Canadian Post Office. Purpose of the system is to observe the flow of mail along conveyor systems to detect any interference. The system has been installed by Canadian Aviation Electronics.

\* \* \*

★ It has been said that, within a year, the transistor will mean the beginning of the end of the vacuum tube.

\* \* \*

★ Over three and a quarter million dollars worth of contracts were awarded to the Canadian electronics industry by the Department of Defence Production between November 1st and November 30th last. This total does not include contracts for less than \$10,000, orders for secret equipment or material contracted for in other countries.

\* \* \*

★ Electronic components imported into Canada for use in guided missiles, atomic energy applications or for use in uranium exploration come into the country free of duty and sales tax. When imported for use in aircraft they bear an import duty of 15 per cent. When imported for any other use — and this means the many applications in radio, television and for industrial use — they bear a 20 per cent duty.

\* \* \*

★ The General Electric Co. in the United States has announced a general reduction in list prices on all tone-signalling equipment used with two-way radio facilities, with the cuts ranging from \$4 to \$500 on seventeen different pieces of equipment presently in the G-E line. James D. Helm, Sales Manager, Mobile Communication Equipment, said that the lowered prices "are a direct result of the increasing volume of tone equipment sales".

\* \* \*

★ The possibility that amplitude-modulated VHF land mobile radio-communications facilities will "make substantial contributions" as VHF communication "progresses further in Canada" were described in the British Pye Telecommunications News Letter of December, 1954. The article, attempting to show, "not that AM is superior to FM, but that in the VHF land-mobile communications field it has something to offer that warrants earnest consideration when drawing up specifications for a two-way radio system," notes that "in the United Kingdom, where the prospective customer has always been able to choose freely between the two systems of modulation, 90 per cent of radio systems currently in operation employ AM".

\* \* \*

★ There are 465 telephone systems within the jurisdiction of Ontario. These systems operate 176,583 telephones, 30,808 miles of pole lead carrying 291,860 miles of wire, and the whole investment represents nearly \$24,000,000.



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CANADIAN MARCONI COMPANY

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## The Editor's Space



It's our opinion that the Government will take a considerable amount of persuasion before it drops the 15 per cent excise tax on television receivers — a tax based on the premise that general revenue funds should not be used to help finance the C.B.C.'s television programs for the benefit of the minority who own television receivers. It's our further opinion that if Ottawa authorities want to justify the continuation of the tax they should revise their reasons for its imposition. If — as reported — Canadians are buying television sets at the rate of one every six seconds, that minority who own television receivers will soon be a thing of the past. Unfortunately, taxes, like Lord Tennyson's Babbling Brook, sometimes "goes on forever".

An attractive brochure describing opportunity for business and industry in Trinidad, B.W.I., tells how the colony's "Aid To Pioneer Industries Act" allows a five-year immunity from income tax, a liberal depreciation write-off after the initial five-year period, duty-free importation of machinery and materials, and provides for the remission of profit and capital gain to the non-resident Canadian investor in dollars. All this within a stone's throw of beautiful Balandra Bay, but our president says the publishing hub of Canada is Toronto and that we have to stay here.

Toured the Deep River installations of Atomic Energy of Canada Limited recently, and can say without qualification that the plant is one of the most fascinating that I have ever been privileged to see. Though only a few Canadians will perhaps ever have a chance of seeing it, they can be proud and assured that the atomic research being carried out at Deep River will keep Canada in the forefront of nations in the matter of atomic developments.

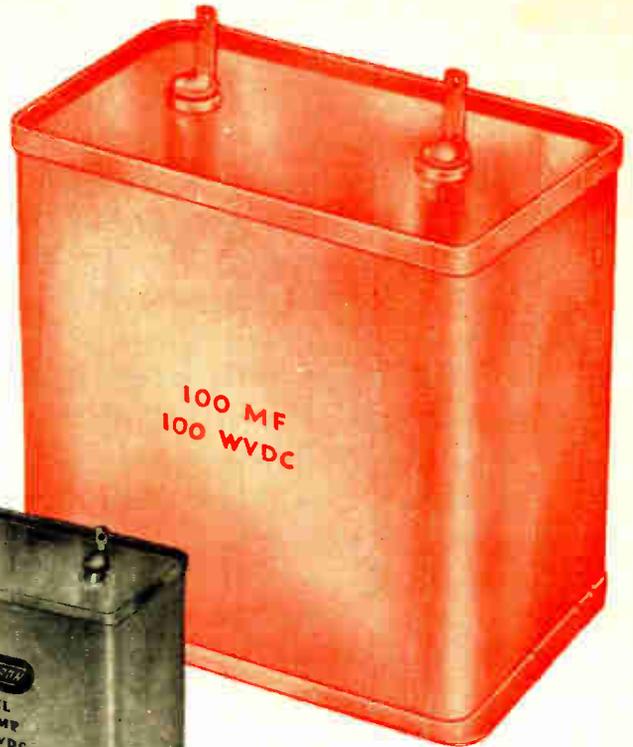
Thanks to George Glinsky and Doug Peacock for their kind invitation to visit the new laboratories and workshops of Computing Devices of Canada Limited in Ottawa. If one would like to measure the growing importance of electronics as a Canadian industry, this company may serve as a good yardstick. To use a colloquial form of speech, it may be said that this firm is growing like a hot-house mushroom and there's no telling where its next root will break through in the form of yet further plant facilities.

Apropos a recent trip to Canada's atomic plant at Deep River, it gave this reporter a strange feeling in the pit of the stomach to be standing on top of the NRX reactor within something like 16 feet of the heart of the contraption, with all those nasty little neutrons and protons swirling 'round ready to lodge in one's spleen or liver should they break from their confinement. This was the thought. Actually there is little danger of contamination at this plant, so great are the precautions, so I'm told — and hope.

Was pleased to meet Sir Douglas Copland, Australian High Commissioner to Canada, following his recent address to the annual meeting of the Business Paper Editors' Association, held in Ottawa. Sir Douglas more than hinted that there was a lack of Australian news in the Canadian press. Should Sir Douglas perchance see this squib, he may consider it an invitation to use

(Turn to page 12)

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Astron Metalite<sup>®</sup>  
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ONLY 1/7 the size and weight of equally rated, high capacitance, low voltage, paper and foil capacitors. Astron Metalite Hy-Met utilizes lacquer coated dielectric tissue on which an aluminum film approximately 50 millimicrons thick has been deposited . . . to eliminate the bulky windings necessary in larger conventional paper and foil capacitors. The all important space and weight saved enables Astron to build a dependable high temperature Metalite Hy-Met (operation up to 125° C) smaller and lighter . . . so small and light that every miniaturizing requirement, no matter how exacting, can easily and efficiently be met.

Modern electronic designs require tiny but tough capacitors able to withstand severe environmental and electrical conditions. This is where ultra-small Metalite Hy-Met "fits in!" Astron uses an extremely pure thermosetting impregnant in Metalite Hy-Met insuring high capacitance stability over the entire operating temperature range -55° C to +125° C . . . units have low R.F. impedance due to small size and short circuit path . . . hermetically sealed . . . positive glass to metal seals . . . a wide variety of case styles and mounting brackets . . . self-healing properties to add extra protection against overvoltages or momentary surges . . . higher insula-

tion resistance . . . metal cased Metalite Hy-Met meets all MIL humidity, thermocycle immersion and vibration requirements. Designing miniaturized electronic equipment, noise suppression circuits, or other devices where space and weight are vital such as airborne units? Then you should have all the details about Astron Metalite Hy-Met . . . for complete design characteristics and physical information write to Astron for your free copy of Bulletin AB-19A TODAY!

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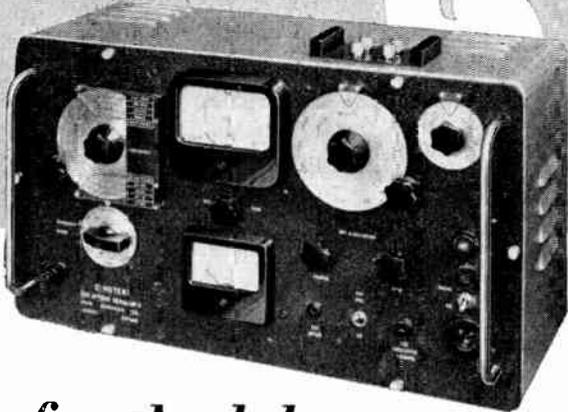
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The DAWE "Q" Meters are designed to add speed, efficiency and accuracy to your factory or laboratory.

Type 622 is designed for the determination of "Q" and related R.F. measurements by resonance methods in the range of 50 kc/s to 75 Mc/s. The instrument is completely self contained, totally enclosed, extremely robust, and can be plugged into any A.C. supply.



Type 620—  
Specially Suited  
For Mass Production  
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The Type 623 supplements the Type 622 model by extending the range of the measurement to 200 Mc/s. Its wide frequency range covers television channels.

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## EDITOR'S SPACE — Cont'd.

the columns of this magazine for any worthy news concerning the Australian electronics or communications industries which may be of mutual concern or interest to our two countries.

Little does Milady with the precious platinum ring on her finger realize the processes of extraction or the history behind the discovery and development of platinum. If she visits the Platinum Metals Exhibit at the Royal Ontario Museum she will realize that there is more than style to platinum, and that its value in jewelry is nothing compared to its value in industry. Property of the International Nickel Company of Canada Limited, the exhibit is a work of art in itself and should be attended by all those in business or industry who are concerned with the use of platinum or its related metals, palladium, rhodium, ruthenium, iridium and osmium.

If there's any difference between "Being on the Horns of A Dilemma" or "Between The Devil and the Deep Blue Sea," Canadian government authorities may consider themselves as being both continually prodded in the buttocks as a result of the first situation and all wet most of the time as a consequence of the second predicament. This conclusion is arrived at from the number of releases received berating this or that government authority for being remiss in a variety of matters ranging from taxes to turnip crops. As far as the government is concerned, it's position in this matter isn't helped any by some of the editorial material produced in this office, which sometimes gives rise to a twinge of the editorial conscience especially after a week's visit among government officials in Ottawa who are in a position to present the other side of the story.

The new NRU reactor presently under construction for Atomic Energy of Canada Limited will have between two and three million dollars worth of instrumentation. It would be interesting to know what proportion of this equipment could be built in Canada and whether the ability of Canadian instrument manufacturers is being used to the fullest to assist in the production and supply of the required equipment. Instrumentation in the existing NRX reactor is predominantly trade-marked "made in Great Britain" and "made in U.S.A."

Was recently informed by an Ottawa newspaperman of a strange communications contraption nestled high in the Peace Tower of the Parliament Buildings in Ottawa with an aerial spur projecting from the side of the structure. Checking on the matter, I've been told by a friend, who is a member of the House on the Opposition side, that the projection isn't really an aerial spur but a gibbet for hanging recalcitrant Liberal M.P.'s. Of course, I don't believe this. They encase such characters in concrete and throw them into the Ottawa River.

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# About This Issue

In the event of a national emergency one of the greatest problems to be faced up to by government authorities would be that of assuring a continued supply of equipment to the armed services. Much of the equipment necessary is not produced in this country. This is particularly so in the case of electronic components.

In order to obviate such a problem the Electronic Component Development Committee of Canada's Defense Research Board has set itself the task of encouraging a purely Canadian program of research and production of electronic equipment that will meet the requirements of the Canadian armed forces. M. L. Card, Chairman of the Electronic Component Development Committee outlines the aims of this government body in the article entitled Electronics For Defense, page 18.

\* \* \*

There is little doubt that Canadian industrialists have recognized the value of two-way communications in their various operations. Canada's largest two-way industrial radio complex, which is one of the largest in the world, is owned by the Iron Ore Company of Canada. Its use permits the efficient transportation of the millions of tons of ore mined annually in Labrador. The story of this radio complex is told on page 20.

\* \* \*

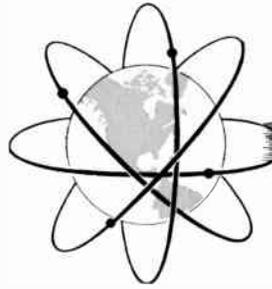
It's possible, but not probable, that many Canadians engaged in the manufacture of electronic components would look to the United States as a likely market for their products. The flow of trade in Electronic components is usually the other way. D. H. Cheney, Canadian Vice Consul and Trade Commissioner in Boston, however, sees the mushrooming New England electronics industry as a possible market for Canadian made components. Mr. Cheney's article appears on page 22.

\* \* \*

A high speed electronic teleprinting system which is claimed to be capable of handling 240,000 words a minute is the subject dealt with in this issue by Dr. Leslie L. Hill, our contributing editor. In commenting on the article all we can say is that Dr. Hill is well qualified as the author of this article because he is the inventor of the system. Dr. Hill's article appears on page 24.

\* \* \*

Automation in broadcasting has now become a reality with the completion and testing of new equipment which has recently been developed in the United States. With this equipment it is now possible to run a ten hour program without the use of human assistance. The equipment is described in the article Automatic Programming on page 26.



# ELECTRONICS *and* COMMUNICATIONS

Vol. 3

No. 1

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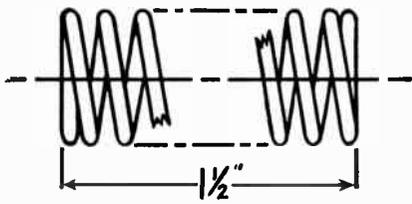
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# Electronics and Communications

## EDITORIAL

Vol. 3 January - February, 1955 No. 1

### A Temporary Tax - - ?

In a democratic political system a careful watch must be maintained by the people on the activities of their elected representatives. Quite often a law passed as a "temporary measure" has a tendency to assume a permanency quite out of keeping with its original purport. One such example is the 15 per cent Excise Tax levied against radio and television receivers. The history of this tax reflects the procrastinating attitude of the Government and indicates how a "temporary measure" made law in 1940 is still in force fifteen years later.

In June, 1940, the Government decided to impose a 10 per cent War Excise Tax against radio receivers. Before this time an Excise Tax had never been levied against radios. The purpose of the tax was a war-time measure to curtail purchasing of consumer products and to help conserve vital war supplies of electronic components. The manufacturers of radios and parts accepted this action as sound Government policy. In December, 1940, the Excise Tax was increased from 10 per cent to 25 per cent, and it remained at this high rate until May, 1945, at which time it was reduced to 10 per cent.

The good faith with which the radio manufacturers accepted the levying of this tax as a war-winning measure was badly shaken when appeals to the Government to remove this "temporary measure", after the war, resulted in a further increase in November, 1947, from 10 per cent to 25 per cent. The Government explained that the 1947 increase was an attempt to alleviate U.S. dollar shortages but it was soon established that the U.S. dollar content of Canadian-made radio receivers was almost nil and in July, 1948, the Government once more reduced the tax to 10 per cent.

After the outbreak of war in Korea, the Government, in September, 1950, increased the tax once again, to 15 per cent, in an effort to prevent an anticipated shortage of critical materials. However, shortages did not occur, either in the electronics or in other industries, and it can quite definitely be stated that the five per cent increase in Excise Tax had nothing to do with this phenomenon.

In April, 1951, the tax was again increased to 25 per cent and was reduced in April, 1952, to 15 per cent, at which rate it has remained to the present time. This is what has happened to a "temporary measure" during the course of fifteen years!

The vacillations of the Excise Tax rates have seriously affected the radio and television industry in

Canada and have resulted in factory lay-offs and loss of trained personnel who gravitate to more stable industries not subject to tax fluctuations.

It is an extremely difficult job for radio or television manufacturers trying to price radio or television receivers at fair market values in one of the most competitive businesses in Canada. This task is made more difficult when manufacturers have to attempt to anticipate the Government's thoughts on the question of whether the Excise Tax is going to be increased or decreased. Distributors and dealers cannot allow themselves to build up large inventories because of the fear of being "caught" with large stocks of taxed goods on their shelves at a time when the Government might reduce, or eliminate, the Excise Tax on these goods.

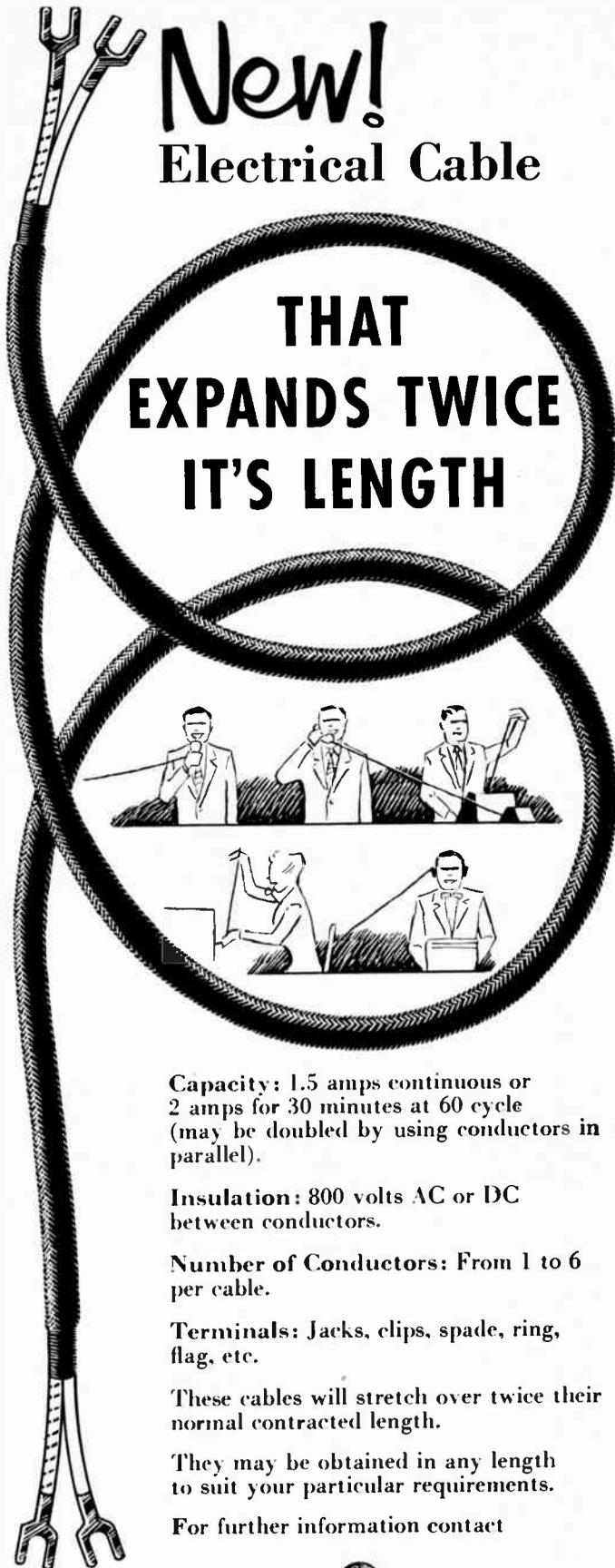
The Excise Tax levied against radio and television receivers is considered by the industry as a discriminatory tax. Of all durable consumer products, only radio, television, and automobiles are taxed at 15 per cent. All home appliances for which it might be considered that the radio and television manufacturers compete for the consumers' dollars are now completely free of Excise Tax, and even luxury items such as perfumes and jewellery are taxed at a lower rate (10 per cent).

A tax which was imposed as a "temporary measure" fifteen years ago and which is still in force at the present time may well be considered as a militating influence against the electronics industry. For this reason its removal should be considered by the government. The sale of instruments of public enlightenment and news dissemination should be encouraged, not retarded. There is no more justification for special Excise Taxes on radios or television receivers than there would be on newspapers.

When the Budget was brought down in April, 1953, it was decided to give added financial assistance to the television service of the CBC by means of the 15 per cent Excise Tax imposed on radio and television receivers. The argument at that time was that owners of television receivers were a minority group and television service should not be paid for from the General Revenue but should be paid for as far as possible by the users of the sets, through the Excise Tax.

The idea of pin-pointing the tax dollars collected from one group of products for a specific purpose was unique in the history of taxation, but even if the reason was logical at that time, the argument is no longer valid. The television service in Canada, through the CBC and private stations, now covers over 80 per cent of the population, with more stations scheduled to open in the near future. There are about 1,250,000 television receivers in operation, one in every three Canadian homes. With such a nation-wide coverage the CBC should now receive any additional financing it justifiably needs from General Revenue and the Excise Tax on radio and television receivers abandoned. Such a move could only result in good — radios and television sets would be cheaper to buy, more people would be able to afford them, and production would increase, creating more employment. Also, the General Revenue would benefit due to the increase in the Government's returns on the 10 per cent Sales Tax, still levied against radio and television receivers, higher Income Tax returns through more employment, and added corporation tax.

These reasons are in addition to the unfairness of overburdening one single industry with a tax which was claimed to be a "temporary measure" fifteen years ago and is still being imposed.



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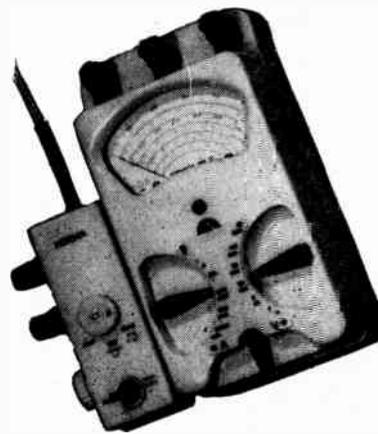


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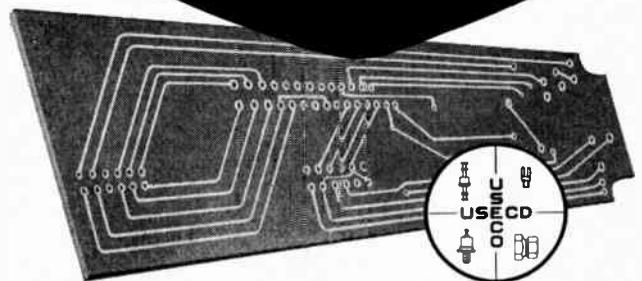


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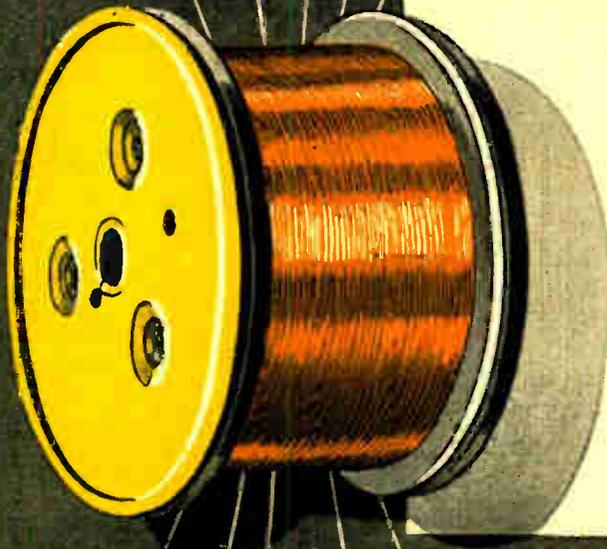
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Electronic Component Development  
Committee Seeks Aid Of Industry  
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# Electronics For Defense

By M. L. CARD

Chairman Electronic Component Development Committee,  
Defense Research Board.

Recognition of the rapidly increasing military dependence on electronic equipments has led the Defense Research Board, of the Department of National Defense, to create an Electronic Component Development Committee. The members advise the Board on a Canadian research and development program aimed at supplying new and improved electronic components.

This report is offered for the information of those interested in this vital undertaking, especially industrial management, whose understanding and support are essential for its success. While the program is intended primarily to meet defense needs, in addition, it will prove beneficial to the Canadian electronics industry.

IT is unnecessary to emphasize the increasing importance of electronic devices in modern military operations. World War II witnessed tremendous developments in the field of detection, communication and control by electronic means. Following the war, new developments and refinements have continued. Increasing attention is being devoted to the necessity for equipment capable of consistently reliable performance even under extremely harsh environmental conditions.

Equipment designed to perform complicated functions tends to become complex and bulky. On the other hand, in many military applications, size and weight must be kept to a minimum. Consequently, a demand has been created for components not only of the highest quality but also of very small physical size.

Much has been written in recent years on the subject of electronic equipment reliability and the U.S. Military Services, particularly, have conducted exhaustive studies to determine the factors involved. Results have shown that while components are not alone the principal causes of failure, as was originally expected, they are serious offenders nevertheless.

It seems obvious that a vigorous program of electronic component research and development in Canada is essential. The United Kingdom and United States have recognized the need and have very extensive and costly programs in operation. The

Canadian effort in this field, however, has been virtually non-existent and the question might reasonably be asked, whether, in view of our comparatively limited facilities, we should undertake work of this kind.

In considering our situation, two important facts emerge — (1) Canada is dependent on outside sources for many of the newer components presently used by the Armed Services and (2) there is a definite lack in Canada of industrial and other laboratory groups capable of developing electronic components for military or commercial purposes.

From the military viewpoint, the supply situation is unacceptable. In an emergency, foreign sources of supply will undoubtedly be denied us and, furthermore, there will not then be time to establish Canadian production. This situation must be rectified. In addition, we are obligated to our NATO Allies to ensure not only that our equipment is compatible with theirs, but also that we assume our full share in supplying such equipment and the necessary components.

Steps should be taken at once, therefore, to introduce in Canadian plants, the techniques and facilities needed to produce the latest types of components. Such a step will present Canada with the opportunity to create the nucleus of industrial laboratory groups capable of developing both military and commercial requirements.

Canadian government establishments are continually seeking new and

special items for defense and other purposes. Many may ultimately be required in substantial quantities. Canadian manufacturers should be able to develop them and put them into production.

It is realized that such facilities might exist already were it not for economic reasons. By offering specific projects to suitable contractors however, the Defense Research Board in conjunction with the Department of Defense Production, is providing the means and incentive whereby our industrial potential may be vastly improved and increased. Further, the existence of active, permanent development groups in industry will greatly help in retaining for Canada many of her young scientists who might otherwise seek employment in the U.S. or elsewhere.

For these reasons, the Defense Research Board, on behalf of the Department of National Defense, has initiated a component development program. Because the Electronic Component Development Committee is largely responsible for the operation of the program, its detailed structure follows.

## ELECTRONIC COMPONENT DEVELOPMENT COMMITTEE

### (a) Purpose of the Committee

Instituted in 1953 by Dr. O. M. Solandt, Chairman of the Defense Research Board, the Committee stems from an earlier Tube Development Committee chaired by Sir Robert Watson-Watt. Mr. M. L. Card, Deputy Director of the Canadian Military Electronics Standards Agency, has been Chairman of the new Committee since its formation. The Committee's structure is shown in the accompanying chart and its functions are as follows:

The Committee will:

- (i) "advise the Defense Research Board on administrative, financial and technical requirements for all research and development on electronic components with the objective of

● M. L. Card, Chairman of the Defense Research Board's Electronic Component Development Committee.



fostering a Canadian components industry increasingly able to meet the requirements of the defense program including authorized international programs. For the purpose of these Terms of Reference, an electronic component is defined as being any item utilized in electronic apparatus and associated electric equipment;

- (ii) recommend to the Defense Research Board a detailed and co-ordinated research and development program in Canada, having regard to the programs of, and in liaison with, other Committees with similar functions in the UK and US; supervise the technical aspects and report on the progress of this program;
- (iii) be cognizant of qualitative and quantitative requirements for new component developments from the Services, other Government establishments and Agencies, and establish procedures for implementing requirements of defense interest in the most expeditious and economical manner;
- (iv) recommend the appointment of, and monitor the technical duties of, project officers and such working panels as may be necessary to supervise the details of specific projects."

The Committee is required to be cognizant not only of Canadian military requirements, but also of parts research and development projects under way in other government and industrial agencies and especially the invaluable programs in the U.S. and U.K. on which many Canadian projects are based and will continue to depend.

Every effort is made to facilitate the exchange of parts development data between allied activities and to ensure that such information is channelled to the scientists, engineers and techni-

- Dr. O. Solandt, Chairman of the Defense Research Board.

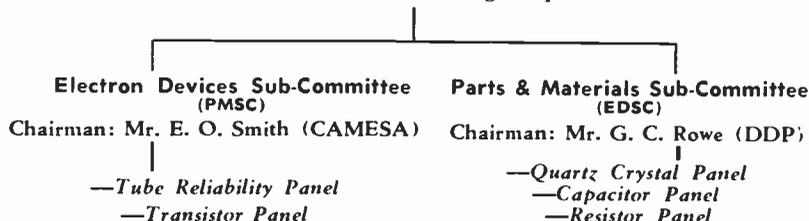


## ELECTRONIC COMPONENT DEVELOPMENT COMMITTEE (ECDC)

**Chairman** . . . Mr. M. L. Card,  
Deputy, Director, Canadian Military Electronics Standards Agency (CAMESA).

**Secretary** . . . Mr. J. W. Webber,  
Defence Research Telecommunications Establishment  
(Electronics Laboratory), Montreal Road, Ottawa

**Membership** . . . Representatives of  
Department of National Defence (DND)  
Department of Defence Production (DDP)  
National Research Council (NRC)  
Atomic Energy of Canada Ltd. (AECL)  
Canadian Broadcasting Corporation (CBC)



cians charged with specific aspects of the Canadian enterprise.

Duplication of research and development objectives is avoided except where it is essential to the development of Canadian production from unique materials available to our industry. The deliberate duplication of research projects, sometimes encouraged in larger countries, is not believed economically feasible at this stage of development in Canada.

An important contribution of the Electronic Component Development Committee will be the knowledgeable co-ordination of research and development activities occurring in scattered laboratories.

This co-ordination will provide also opportunities for achieving the standardization of end products. Standardization of military electronic components in Canada is the responsibility of the Canadian Military Electronic Standards Agency, (CAMESA). Technical members of the Agency serve on the Electronic Component Development Committee and provide the representation by which Armed Service development requirements are brought before the members.

### (b) Membership

In addition to CAMESA members representing the Armed Services, other Government departments and agencies are represented. The Department of Defense Production, vitally concerned with the contractual aspects of the program, the National Research Council, Atomic Energy of Canada Ltd., and the Canadian Broadcasting Corporation have provided members.

A permanent secretariat is being established at the Defense Research Telecommunications Establishment (Electronics Laboratory) in Ottawa. Among the duties of the secretariat will be the executive action required for the processing and monitoring of approved projects.

The program divides logically into two kinds of projects — those relating

to electron devices or tubes and those pertaining to all other components and materials. Accordingly, two Sub-Committees were formed as indicated in the chart. Their principal function is to consider the details of new requirements in their respective fields and to recommend suitable projects to the main Committee.

Under the Sub-Committees, a number of specialist Panels have been formed. More may be added as the program develops. Besides assisting the Sub-Committees, the Panels provide forums where scientists working with particular types of components may discuss their activities and exchange useful information. For this reason, Panel members normally are chosen from experts with special knowledge engaged in fundamental or applied research.

Mr. E. Forster, Chairman of the Radio Components Research and Development Committee in the U.K., recently stressed the importance of the contribution such groups can give. His Committee regards its panels as "absolutely essential to ensure a successful development program".

### CURRENT PROGRAM

Thus far, about 28 projects have been included in the Component Development Program at a total estimated cost of approximately \$700,000. Approximately 75 per cent are development projects intended for industry. The remainder are research problems suitable for universities or research organizations.

Since the program results from Armed Service requirements and is supported by contributions from RCN, Army, RCAF and DRB, the Joint Services Electrical and Electronics Committee meets annually with the Electronic Component Development Committee to review the program on behalf of the Services.

It will be appreciated that such development contracts require lengthy  
(Turn to page 34)

# Industrial Communications

Production Of Canadian Mineral Wealth  
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## FM Radio Networks

**T**HOUSANDS of radio messages, flashed between offices, ore trains and fleets of mobile equipment, played an important part in the movement to North America's steel mills of the first 2,000,000 tons of Labrador's rich iron ore.

The messages were handled by an FM radio network—one of the world's largest installations—which the Iron Ore Company of Canada is using to speed and co-ordinate its mining and loading operations and traffic on 360 miles of railroad.

Until the Iron Ore Company started its \$250,000,000 project, communication systems in the Labrador wilderness had been confined to the signal fires of Indians who lived there nearly 100 years ago on vanishing herds of caribou. In the same areas today, the company and its subsidiary, the Quebec North Shore and Labrador Railroad, are operating a \$6,000,000 complex of radio, telephone and signalling equipment. As part of this complex, the FM network provides the important link between supervisors and the crews and operators of mobile units, ranging from the long ore trains to trucks and power shovels. It also connects the mines at Knob Lake to a power station at Menihek Dam and the terminal and docks at Seven Islands to a power development on the Marguerite River.

Built up and expanded during the past two years, under the supervision of A. K. Hansen, Superintendent of Signals and Communications, the company's FM network now provides every type of contact needed to maintain communication with mobile equipment. It uses over 100 fixed and mobile Motorola radios supplied by Rogers Majestic Electronics Ltd., of Leaside, Ontario, and about 25 "Handie-Talkie" two-way radios. Various auxiliary units, such as the directional antennae at Seven Islands,

also supplied by Rogers, complete the installation.

### Speed And Safety

The largest proportion of the FM equipment is used to help speed and safeguard the movement of ore trains. For end-to-end communications on the 357-mile run from Knob Lake to Seven Islands, the company relies on telephones. The FM radio has a range of between 30 and 40 miles. It enables traffic supervisors at Seven Islands and Oreway, the half-way point, to converse with the crews of approaching trains and permits an exchange of messages between cabooses and locomotives and between one train and another. Provision is also made for wayside-to-train communications at a number of points.

Forty-five of the company's Diesel locomotives are radio equipped and other sets are installed in 15 cabooses. The traffic supervisors at Seven Islands and Oreway use fixed units.

Another section of the FM network provides complete communications in the dock area. It operates on a special frequency at only 5 watts of power, compared with 30 watts for the main FM system. The mobile equipment in which dock area radios have been installed include pusher locomotives, cranes, a giant stacker and ship loaders, which handle 8,000 tons of ore an hour.

About 40 of the mobile units used by the FM system are installed in trucks, jeeps and other vehicles working at Knob Lake and Seven Islands. They help make up a third major section and provide a direct contact between their drivers and supervisors responsible for mechanical, electrical and mining operations.

In planning the FM system, the company stressed standardization throughout. A number of unique installation methods and special pro-



● Fifty foot antenna tower carrying three special type antennas supplied by Rogers Majestic Electronics Limited.

visions for auxiliary power were also used.

### Standardization

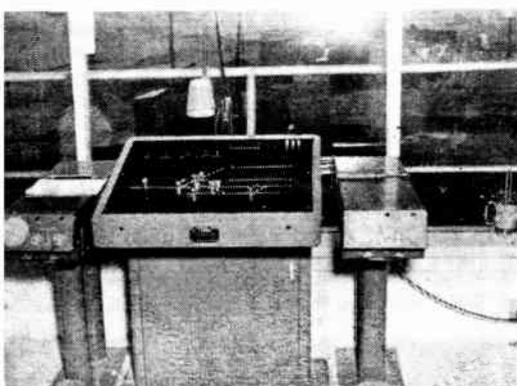
The fixed stations at Seven Islands employ conventional Motorola mobile equipment mounted in the drawers of standards steel desks. The usual carbon microphones have been replaced by variable reluctance types, and contact with either of the two transmitters is made through a relay controlled by press-to-talk switches.

All fixed stations in the FM system not located where terminal standby power is available, are provided with 3 KW emergency automatic plants. The sets in the cabooses of the ore trains use axle-powered alternators which charge 12-volt batteries.

To move the first 2,000,000 tons of ore to the Seven Islands docks, the Iron Ore Company ran three trains a day over its 360-mile route. When each season's shipments reach the scheduled 10,000,000 tons, seven to nine trains a day will be needed. There are 23 passing sidings along the single main line track, and each train consists of 100 to 115 cars.

Thanks to the two-way radio system, train traffic can be handled with a minimum of delay, and precious minutes saved at the sidings. The assembly and switching of the long trains is also aided as conductors employ the end-to-end link to signal engineers, and station operators use their fixed equipment or portable units.

● Left:—Two Motorola 10 watt VHF units mounted on pillar posts with foot switch controls. Center:—A typical locomotive cab installation. Right:—10 watt VHF equipment uniquely mounted in drawers of steel desk.



# Manufacturing

## Plate Dissipation Measurements In Pulse Circuits

By S. F. LOVE — Radio Valve Co., Ltd.

Knowledge of the plate dissipation of a tube can avoid field troubles and assure long and dependable tube life.

An investigation was made into methods of plate dissipation measurements to evolve a simple and reliable method of finding the plate dissipation in the horizontal output tube of a television set. Several methods were evaluated and compared. The methods are applicable to all types of pulse circuits, particularly where the waveforms are not readily analysed. The method used depends on the accuracy desired and the equipment available for measurement.

### THERMOCOUPLE METHOD

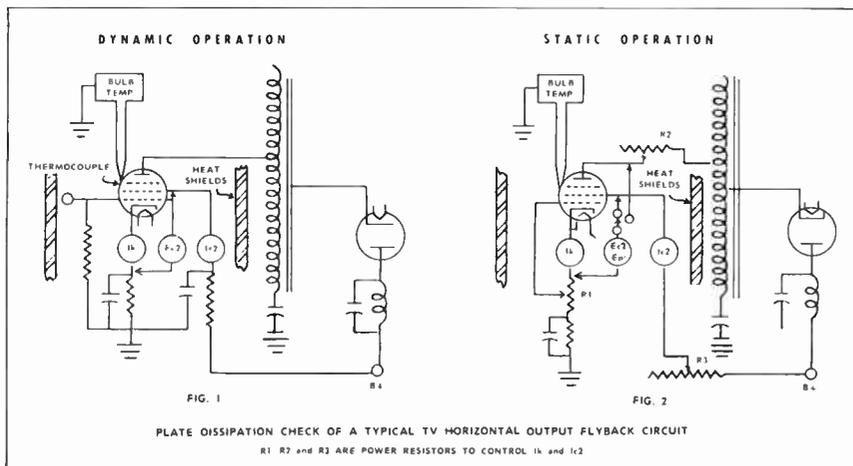
**Use:** This method is used where accuracy is desired and a thermocouple can be placed on the tube near the plate, and the ambient temperature can be controlled.

**Advantages:** The advantage over other methods described here is its simplicity and accuracy.

**Theory:** If the wattage dissipated in the screen, cathode and plate are the same in the dynamic and static cases, it follows that the bulb temperature is the same. The nearest approach to this condition is to have the screen and cathode average currents the same in the static as in the dynamic case. The screen voltage arrived at will be essentially the same as the operational value. In this case the screen and cathode dissipations will equal their dynamic values, leaving only the plate dissipation to be determined.

### EQUIPMENT

1. Thermocouple and millivoltmeter or sensitive microammeter.
2. Thermometer for room temperature.
3. Voltmeter for the heater voltage.
4. A dc voltmeter for the screen and plate voltages.
5. A dc ammeter for cathode and screen currents.
6. Suitable power resistors to vary plate and screen and grid voltages.



### METHOD

1. Fasten the thermocouple to the side of the tube opposite the hottest part of the plate by cement or glass tape.
2. Record the thermocouple reading for dynamic operation of the tube in its circuit.
3. Substitute dc grid, screen and plate voltages to obtain the same thermocouple reading as for dynamic operation, along with the same cathode and screen current.
4. Then the plate dissipation equals the plate current times the dc plate to cathode voltage.

### PRECAUTIONS

1. Keep the thermocouple position unchanged.
2. Twist and by-pass the thermocouple leads to avoid an rf loop.
3. Ground the thermocouple indicator to avoid accumulation of a static charge.
4. Use heat shield between the tube under test and nearby tubes. These should be at least  $\frac{1}{2}$  inch from the tube under test. Do not move them. In the case shown, the plate current is passed through the damper tube and transformer in the static case to maintain their approximate temperatures.
5. Control the ambient temperature to  $\pm 1^\circ\text{C}$ .
6. Control the filament voltage closely.

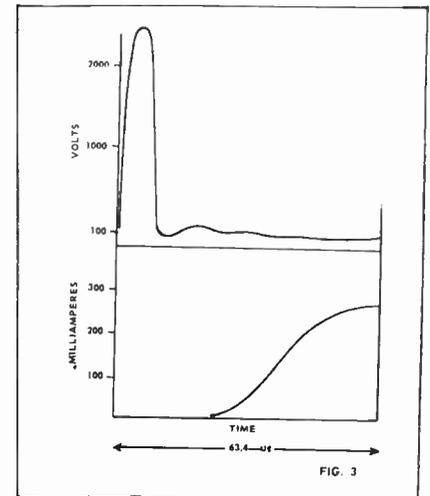
### D.C. SUBSTITUTION METHOD

**Use:** This method is especially useful for a pentode. The plate and screen must have constant voltage waveforms during the period of conduction. This is generally the case in a television horizontal output stage.

**Advantages:** This method, where applicable, is fast and requires only a few meters.

**Theory:** If the plate and screen have constant voltage waveforms during the period of conduction, then the ratio of plate to screen currents remains the same throughout the cycle. The screen voltage during this period is generally known or easily determined. By substituting dc voltage for the screen in a non-operational circuit the plate and grid voltages can be juggled until the screen and plate currents have the same ratio and magnitude as in the operational circuit. From this the effective plate voltage is found and hence the plate dissipation.

The Horizontal output stage of a Television receiver such as Figure 1 is a good example of the above.



● Typical Plate Voltage and Plate Current Waveforms In a TV Flyback Circuit.

In Fig. 3 is shown one cycle of typical plate voltage and plate current waveforms. During the major part of the current flow the plate voltage is substantially constant. This assumes that the tube is properly cut-off during the retrace pulse.

### EQUIPMENT

1. A dc screen current meter.
2. A dc cathode current meter.
3. A dc voltmeter for the screen and plate voltages.
4. Suitable power resistors to vary the plate, screen and grid voltages.

### METHOD

1. Measure the dynamic values of the screen and cathode average currents.
2. Measure the dynamic value of the screen to cathode voltage. If this is not pure dc an oscilloscope is required to determine the screen voltage effective during current flow.
3. Make the circuit non-operational and connect controlled dc plate, screen and grid voltages as in Fig. 2. The shields and thermocouple are not required.
4. Maintain the screen to cathode voltage at the value found for dynamic operation.

(Turn to page 30)

## Marketing

D. H. Cheney, Canadian Vice-Consul, Boston,  
Writing In "Foreign Trade" Sees New England's  
Manufacturers As Potential Market For . . . .

# Canadian Components

By D. H. Cheney

The oldest industrial area in the United States has become the centre for one of the newest industries — electronics. Situated close to Canada and in the market for large quantities of materials and services, these companies might prove good sales outlets for Canadian suppliers.

The old sea dogs of Boston, Salem and New Bedford would recoil in terror from the witchcraft that permits modern ships to navigate and fish by means of electronic devices. Even at the beginning of World War II, few people had heard of "electronics". Today it has become a synonym of progress. And in New England it is symbolic of the revolution taking place in this oldest industrial region of the United States.

New England electronics manufacturers specialize in industrial products or component parts for consumer-type products. These products are high in value in relation to size and include transistors, tubes, capacitors, instruments and switches. None of the principal television manufacturers is located in New England although the region supplies a very high proportion of the component parts for television sets. Between 35 and 50 per cent of the average firm's sales are against defense orders.

Markets for the products of these New England factories are fairly evenly divided between the north-eastern states and the rest of the country; only about two of every five firms do any exporting and exports account for only about 3 per cent of total sales. The most serious competition apparently comes from firms located in New York, New Jersey, Pennsylvania, Illinois and California and, to a lesser extent, from the Middle West.

### Opportunities for Canadians

Are there opportunities for our own manufacturers to increase their sales in New England? Almost certainly there are, though for the most part sales must be diligently sought after. Experience has shown that the majority of New England firms, though they may be anxious to contact alternative suppliers, have never given Canada a thought. It is up to Canadian firms to see that they do. A ready welcome awaits the Canadian salesman who has something to offer in the

way of cost saving or a dependable supply of some needed material. Written inquiries are welcomed and given careful and courteous attention. They should be followed up with a personal visit where any interest is indicated.

Obviously there is a definite limit to what the Trade Commissioners can do to produce this kind of business. The highly technical nature of much of today's electronic equipment is beyond us. However, carefully planned promotion, carried forward by qualified sales personnel, could produce surprising results. Naturally, security regulations which surround much of the defence work make it extremely difficult for firms not cleared to handle classified material to obtain sub-contracts. Advice from the American manufacturers themselves regarding procedures to be followed for securing clearances can be most helpful. Here again, personal contacts can be of great value.

Copies of the new electronics directory for New England are in the hands of the Department of Trade and Commerce in Ottawa and the Trade Commissioner in Boston. Names of manufacturers and the products they make will be gladly supplied on request.

Are there circumstances which favor Canadian Manufacturers looking to the New England market? Many Canadian factories are located reasonably close to the big producers in Massachusetts, transportation facilities from Canadian points such as Montreal are excellent, and the high value-to-volume ratio of electronics components means that they can stand these transportation costs.

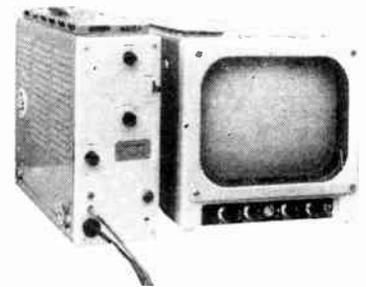
Electronics are the biggest thing in New England since the days of the clipper ships and prospects for the future growth and development of the industry are extremely bright. Salesmen from all parts of the United States are bidding for a share of the sub-contract business. One manufacturer alone issued \$70 million worth of these sub-contracts last year. It is a challenge to Canadian exporters.

## Electronic Peeping Tom

*Two hundred eyes peer through one microscope simultaneously*

It sounds impossible, but it is nevertheless true, that two hundred eyes can now look through one microscope simultaneously. This feat is now being accomplished by attaching a new industrial television camera, which is now available on the Canadian market, to the microscope. The result is, that the image being examined through the microscope can be transmitted to a screen up to 300 feet away. The new camera, only 5" square by 10" in length and weighing 8½ lbs. is easily used in positions inaccessible to the human observer.

This is only one of the unlimited potential industrial and commercial applications of this type of television apparatus. Already this amazing camera, is being used in banks to enable tellers to have cheque signatures transmitted instantly and verified



● A standard television receiver may be used as well as the precision monitor supplied with the television chain.

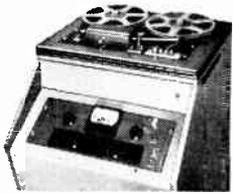
from centralized records. The office of a plant superintendent can maintain visual control of otherwise dangerous or inaccessible processes at the other end of a plant, or mining mill operation. Wherever human observation is limited due to inaccessibility, danger, or by reasons of economy, the new Pye camera is indispensable.

### Miracle Tube

The heart of the camera is a "miracle" pickup tube 1" in diameter x 6" long known as the "STATICON" which operates on an entirely new principle of "photo conduction" rather than "photo emission". This new principle results in a tremendous reduction in cost, weight, and size.

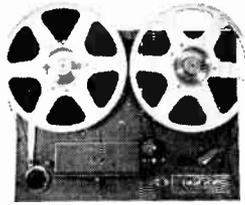
The control unit permits remote optical and electronic control of the camera unit. It boasts a greatly simplified circuitry, containing only 22 tubes, while retaining unimpaired performance, and a standard television receiver may be used as well as the precision monitor available. Combined weight of the television "chain" is less than 100 lbs.

# What's your choice in fine tape equipment?



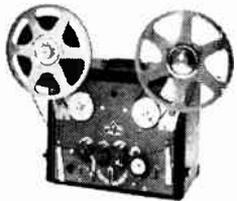
**NEW  
PRESTO  
SR-11**

Complete studio console tape recorder. Never before so much quality, operational ease and value at such a modest price. Embodies the famous PRESTO R-11 tape mechanism, matching amplifier - power supply in sturdy well-designed console cabinet. Three motors for complete flexibility; 15" and 7½" per sec. speeds.



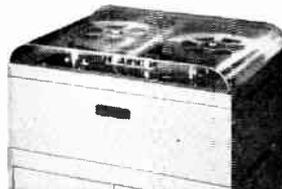
**PRESTO  
R-11**

A tape recording mechanism of truly modern design in engineering and operation. Mechanism includes three-head assembly, solenoid operated brakes and employs the exclusive Capstan drive unit. Tape reels mounted directly on heavy-duty torque motors.



**PRESTO  
R-7**

Rugged, portable tape recorder with separate recording, reproduction, and erasing heads. Built around a sturdy, three-motor drive eliminating friction clutch, the RC-7 contains the same high-quality components found in PRESTO'S fine studio equipment. Heavy-duty construction throughout.



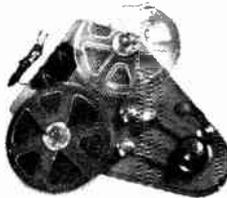
**PRESTO  
PB-17A**

Reliable, long-playing tape reproducing mechanism. Automatically reversible for continuous playback for background music in eight hour cycles. Frequency response uniform from 50 to 8000 cps. Tape speed: 33⅓" per sec. Reels up to 14" diam. (4800' of tape) with dual track.



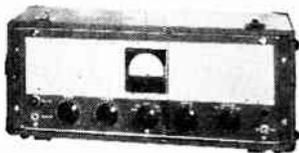
**PRESTO  
900-A**

Precision tape amplifier for portable use or rack mounting. Composed of individual record and reproduce (monitor) amplifiers on a common chassis; separate power supply; three-microphone input, 250 ohm low level mixer; illuminated V.U. meter. Output of reproduce amplifier, 500 ohms, plus 20 db maximum. May be used with any model PRESTO tape recorder.



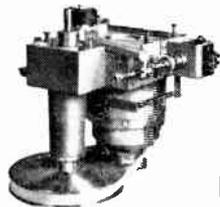
**PRESTO  
TL-10**

Turntable-driven tape reproducer. Unique, low-cost unit that adapts any 16" turntable for reproduction of tape at 7½"/sec. or 15"/sec. with exceptional accuracy. No pre-amplifier required; plugs into standard studio speed input equipment.



**PRESTO A-920**

More compact than the 900-A. In carrying case or for rack mounting. Consists of microphone preamp, a reproduce preamp, power amplifier and power supply - all on a common chassis. Two small speakers mounted behind front panel for playback. Single mike input: 250 ohms. Playback output: 15 ohms, 10 watts.



**PRESTO  
CDR-200  
CAPSTAN  
DRIVE UNIT**

Heart of all Presto tape recorders and reproducers. Motor, capstan and flywheel, pressure pulley and pressure pulley solenoid are mounted on independent cast aluminum chassis. Positive, very quiet tape drive with minimum of parts.

Behind every piece of tape equipment are these PRESTO "extras" - painstaking craftsmanship, years of experience... quality control... and advanced production facilities that guarantee instruments of absolute precision and lifelong dependability.



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 900-A Tape Amplifier  CDR-200 Capstan Drive

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# High Speed Electronic Teleprinting...

By LESLIE L. HILL, Ph.D.

Contributing Editor — *Electronics & Communications*

The following article is the first published account of a new high speed electronic teleprinting system which is believed to be the fastest printing system in the world. The principle underlying the technique is the basis of patent issued in the name of Dr. Leslie L. Hill, Contributing Editor of *Electronics and Communications*. Development work on the system is now being progressed and when completed will provide the telecommunications industry with a teleprinting system capable of operating at a maximum speed of 240,000 words per minute.

A HIGH speed printing telegraph (or teleprinting) system is defined as one in which without the help of photographic means the characters of a language are printed directly on paper at the receiving end and is thus immediately available for use.

As far as it is known the maximum speed achieved by other systems of this category is about 120 words per minute.

The Ultrafax System of the Radio Corporation of America claimed to be capable of operating at a speed of a million words per minute utilizes television technique and resorts to photographic means for recording the messages at high speed at the receiving end; whereas the proposed System is neither facsimile nor television, but a basically new invention capable of operating at a maximum speed of 240,000 words per minute. This is at present the electrical limit, but unfortunately mechanical difficulties have limited the working speed to 120,000 words per minute.

The proposed Printing Telegraph System is equally applicable to land-lines, submarine cables and radio networks. Since bandwidth is a direct function of speed, it follows that the operating speed will be restricted by the characteristics of the "link" in use, such as the submarine cables, land-lines or radio, the System can be slowed down to less than 10 words per minute, it can be worked on submarine cable networks having restricted frequency pass band of zero to 240 cycles per second, and in such applications the traffic handling capacity of any wired "link" can be doubled. At present submarine cables operate at 66 words per minute, but with the proposed System they can operate at 132 words per minute easily. When the cost of laying an additional submarine cable is borne in mind, the advantages of the system stand out. Because the Ultrafax System works on Television principles, it requires an enormous bandwidth of several million cycles, it cannot be slowed down to work on "links" of restricted bandwidth, such as submarine cables, telephone and telegraph land-lines.

Except for the paper tape or page, which is the only moving element in the whole system, the invention is fully electronic.

It is designed to handle any language

of the world and that language can be changed in an instant, such as Chinese to Arabic, to Roman, to Sanskrit, to Russian, to Greek, etc., etc. This is impossible in any other teletyping systems.

## Working Principle

The system works on the following principles:

In order to transmit any language of the world, it is essential to first standardize a print of that language and prepare a stencil bearing the characters of the language (alphabet, numerals, etc.). This stencil is used as a "Master Stencil" in the transmitter. For the purposes of reception another stencil is required on which the characters of the language are printed essentially in the same sequence as in the transmitting stencil, but in this case it is not necessary to use identical prints.

When a change in language is desired, it is only necessary to change the stencils. This feature is most important from the point of view of secrecy of communication even using the same language, because the secrecy is governed by the sequence in which the characters of the language appear on the stencils. Therefore, in case of war, when the machines may be captured by the enemy, interception of communication becomes impossible after the stencils are changed.

In this Electronic System the messages are first typed manually on paper tape or page using the "Standard Print" and then the tape is run at the desired speed through the transmitting machine up to 120,000 words per minute maximum. Every letter of the message is photoelectrically matched with the letters printed on the stencil and, when they register, a pulse is released. The pulse being the shape of a sine squared wave minimum bandwidth in transmission. The System employs "Pulse Position Modulation Techniques" in which the phase of the intelligence pulses in relation to a reference sine wave of a frequency equal to  $\frac{1}{2} k$  (where  $k$  equals the number of characters on the master stencil) determines the transmitted character. The low frequency reference sine wave is generated by an oscillator having a range of 0.9 to 5,000 cycles per second for speed up to 120,000 words per minute.

(Turn to page 34)

## Protection For Industrial TV

An all-weather TV camera box now makes it possible to apply industrial TV to jobs heretofore ruled out because of environmental conditions.

Designed to house and protect the TV camera from cold, heat, rain and snow, the new aluminum box enables permanent camera installations out-of-doors, in hazardous plant locations, and at unsafe test or experimental areas.

Typical new uses will include remote traffic-control in railroad yards; patrolling vast unprotected areas such as warehouses; viewing high temperature processes such as are carried out in furnaces; safe-distance regulation of hazardous operations in chemical plants and in nuclear research; and ambient observation of extreme temperature and altitude testing of material manufactured for the military.

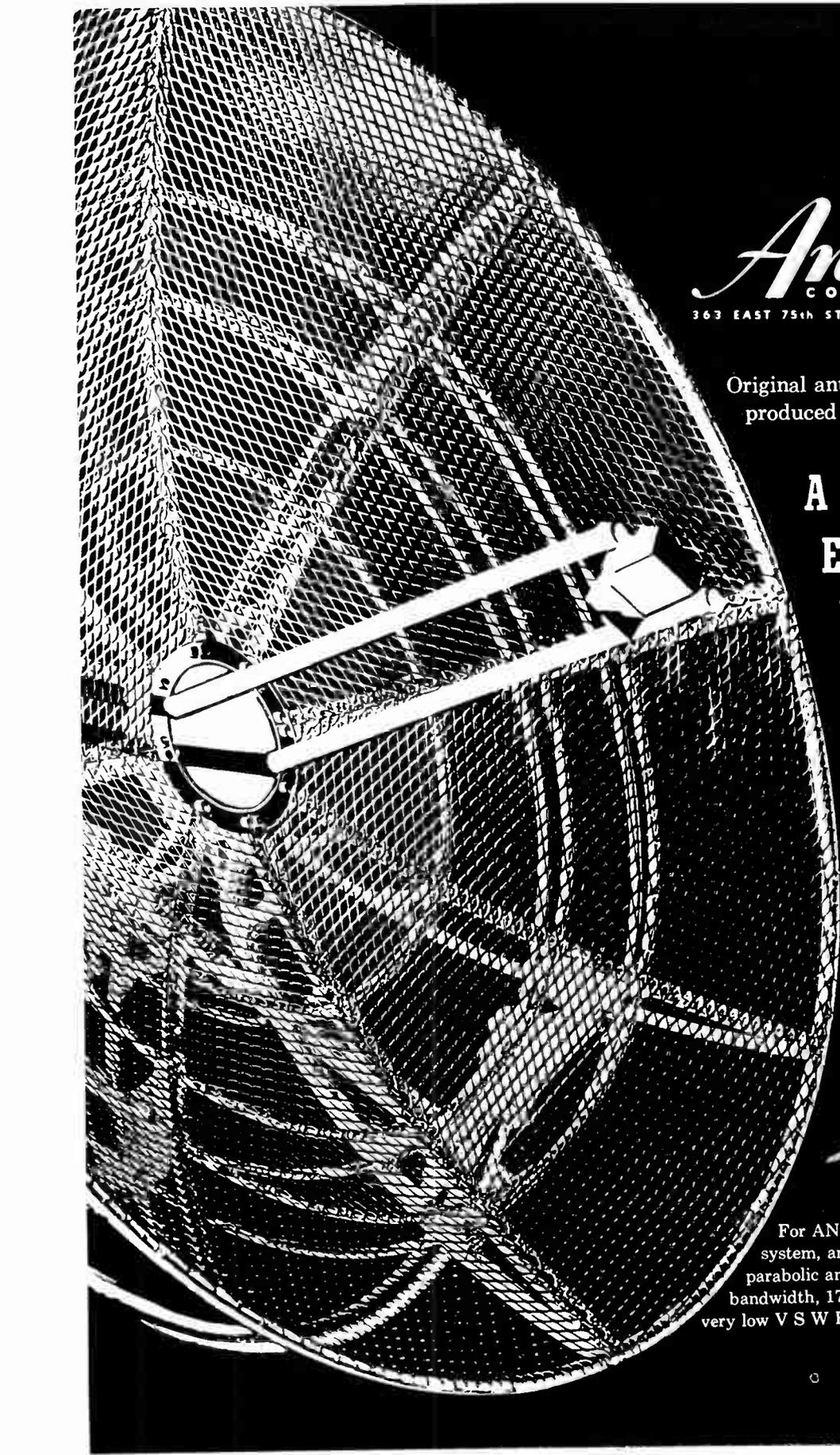


● Weathertight container extends use of industrial television applications.

The insulated box mounts on a tripod. It has an adjustable bed-plate to enable use of 2, 4 and 6 in. lenses. One end of the box is equipped with a thermopane window through which the camera takes pictures. The window has remote-controlled inside and outside windshield wipers to prevent rain (outside) or condensation (inside) from obscuring the view.

Electric ribbon heaters are mounted along the inside walls of the box and are thermostatically turned on when the temperature drops below 40°F. A fan is thermostatically turned on when the temperature exceeds 40°F. Air is filtered in through the bottom of the box and is exhausted through the back. The fan motor requires no lubrication.

When equipped with suitable auxiliary equipment, the box may be rotated and moved up and down for panning.



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● Automation in broadcasting is now possible with the three trim units pictured at right.

**A**UTOMATION in the broadcasting field became a reality recently when a large manufacturer of recording equipment announced the successful completion of a six week test of its automatic programming equipment.

The system can broadcast a better than ten-hour schedule without the need for human assistance of any kind.

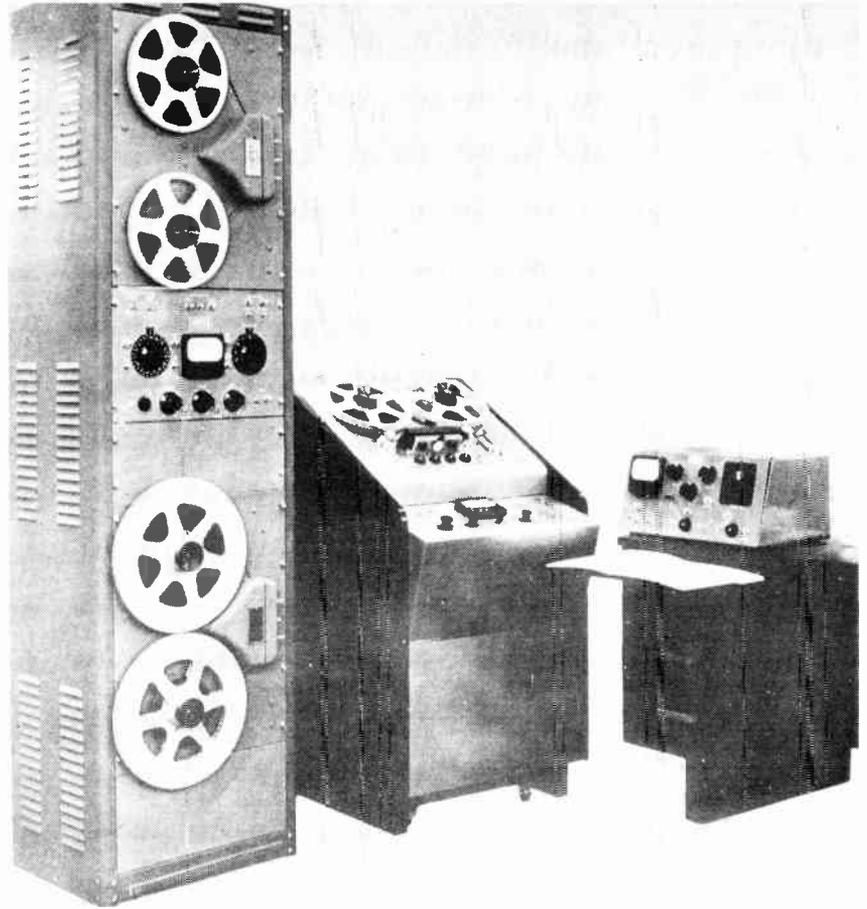
Basically it consists of two electronically interlocked tape playback units, one capable of playing eight hours of recorded material from a single tape, and the other, up to four hours. On the first unit is placed program material, either from a library built up by the station over a period of time or from a network or commercial transcription service. Spot announcements, local programs and station breaks are recorded daily in the station's own studio and placed on the second machine.

After each segment of program material and after each local announcement, a sub-audible tone is recorded. At the end of a program segment, the electronic "brain" hears this tone and starts the announcement machine. After the announcement, another tone starts the program. This see-saw action continues until, at each half-hour, a timing device corrects for any slight time deviation in the system and inserts a station break.

During the trial, test engineers used the equipment only during evening periods since sufficient pre-recorded material to sustain complete broadcast schedules is not yet commercially available. In actual practice, a local music station over a period of time could build up a library of recorded programs which could be repeated periodically with only the announcements being changed.

*Efficient Use of Personnel*

For instance, the duty announcer could devote himself solely to the



Broadcasting

Station Operation With Greater Economy Is Now Possible With . . .

**Automatic Programming**

preparation of newscasts without interrupting his train of thought whenever an announcement had to be made. Also, the voices of two or three announcers could be used to add variety without all of the announcers having

to be in the studio at the same time.

It is this more efficient use of personnel that Ampex, builders of the equipment, expects to be the biggest boon to station operators. An announcer can

*(Turn to page 34)*

**QUARTZ CRYSTALS FOR EVERY APPLICATION**



WE MAKE A WIDE RANGE OF TYPES & FREQUENCIES FOR COMMERCIAL AND MILITARY USES.

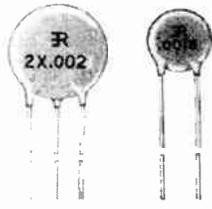
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DEPENDABLE PERFORMANCE**

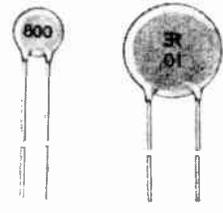


Style 812      Style 801

Single, Dual or Triple Capacity Units.

**ERIE DISC CERAMICONS**  
Temperature Compensating, By-Passing, and High Voltage

Are available in the three types, General Purpose, High Voltage, Temperature Compensating, each having a wide range of values. These capacitors consist of flat ceramic dielectrics with fired silver electrodes to which lead wires are firmly soldered. Completed units are given a protective coating of phenolic which is then wax impregnated for moisture protection. Disc Ceramicon sizes from 5/16" max. to 3/4" max. diameter.



Style 831      Style 811

Up to .04 MFD H.V. Discs, 1000 V to 8000 Volts.

### ERIE TUBULAR CERAMICONS



Erie "GP" Dipped Insulated Ceramicons  
5 MMF — 5,000 MMF  
Temperature Compensating Dipped Insulated Ceramicons.  
0.5 MMF — 1,800 MMF



Erie "GP" Non-Insulated Ceramicons  
5 MMF — 5,000 MMF  
Temperature Compensating Non-Insulated Ceramicons.  
0.5 MMF — 1,800 MMF



Erie "GP" Molded Insulated Ceramicons  
5MMF — 5,000 MMF  
Temperature Compensating Molded Insulated Ceramicons.  
0.5 MMF — 550 MMF

### ERIE CERAMICON TRIMMERS



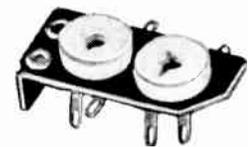
1.5-7 MMF    5-20 MMF  
3-12 MMF    4-30 MMF  
3-13 MMF    7-45 MMF

Style TS2A - CVII  
JAN C81 APPROVED.

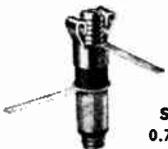


Style 557

1.5-7 MMF    5-30 MMF  
3-12 MMF    8-50 MMF  
5-25 MMF    65-95 MMF  
150 - 190 MMF



Style 3130



Style 535  
0.7-3.0 MMF

The largest and most versatile family of plastic and temperature compensating ceramic trimmer capacitors are available from Erie, to meet difficult tuner and converter requirements.

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## Manufacturing

Inspection Cost Of Cabling Systems  
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Use Of . . . . .

# Automatic Analyser

**M**ANUFACTURERS of products which involve the use of complex, multiple interconnected cable systems are well aware of the difficulties entailed in the testing of such systems. The long tedious hours of manual labour required to test circuits of this nature and the consequent high cost of labor to carry out the operation will be recognized as one of the prime reasons for the high cost of products.

This is a problem that has to be faced by many manufacturers but which can now be eliminated by the use of an automatic electrical circuit analyses sufficiently versatile to be connected to any cable system at any stage of its production, modification or testing.

The flexibility of the tester is such that the adaptation of the tester to any

particular cabling system or panel assembly only requires the use of an adapter cable. The tester itself never has to be modified. Yet, its simplicity in operation enables the average worker to learn its operation quickly and then perform tests in a matter of seconds. The tester will check at the rate of ten circuits per second.

The analyzer was developed to answer the need for a universal tool which could be used to test circuits for all types of errors resulting from incorrect connections, short resistance between circuits and insulation resistance, as well as functionally testing such devices as relays, solenoids, actuators, panel lights, resistors, or other resistance type devices.

### Versatility

Every type of complex, multiple interconnected cable system can be ac-

curately tested. Such circuitry may consist of circuits connected together in various ways, such as by switches, relay contacts, or a common point at a terminal such as a grounding lug. Each complete circuit can be checked automatically for continuity, shorts or insulation resistance. The circuits in the unit under test can be re-arranged by whatever switching mechanism is involved in the unit under test and the tester will automatically check the new arrangement.

Visible matrix type reference charts enable the operator to pinpoint circuit errors. The fault pattern appears readily to indicate interacting circuitry. No time is wasted searching through instruction books.

The analyzer has two test voltages — 28 volts D.C. and 500 volts D.C. An electronic detector approves or rejects circuits consistently to pre-set values. An ohmmeter on front panel allows the operator to conveniently measure the exact value of any circuit resistance, if desired. Simplicity in operation enables the operator to rotate the test selection switch to the desired test voltage position and the test proceeds automatically.

### Push-Button Control

Push button switches permit the operator to manually select any test position at any time during a test cycle. Four Amphenol quick disconnect 100 contact receptacles provide convenient connections to the tester. These quick 100 contact disconnect receptacles allow the user to utilize the analyzer for many jobs. For example, adapter cables for a particular test set-up can be in the process of being connected to their system while the analyzer is being used on another cable system. As soon as the test is completed, the tester can be quickly disconnected and changed over to the new job with another set of adapter cables.

The use of a standard test analyzer along with an economical adapter cable for each job allows one analyzer to perform any number of varied tests. A higher quality, more complete test can be accomplished at each location than has appeared heretofore possible. High cost is avoided and engineering time devoted to special equipment for each test job can be released to other productive work.

An auxiliary receptacle is provided for the operation of external relays at any test position independently of the main test circuit.

American manufacturers of large type airplanes have made exhaustive tests and discovered unbelievable savings were possible with the analyzer. One operation indicated a \$15,000.00 annual saving utilizing the analyzer only four hours per day; another showed \$4,000.00 yearly utilizing the analyzer for 30 minutes daily. In still another instance, a normal two to four hour test time was reduced to as little as five to ten minutes.

## FREQUENCY-SHIFT V-F CARRIER-TELEGRAPH SYSTEM

Provides one, two, or three frequency-shift teletype channels above the voice on a 3400-cycle telephone circuit



A send and a receive panel require 5/4" of mounting space on a standard 19" rack

This system provides an economical trouble-free method of obtaining up to three full-duplex 100 wpm telegraph channels at the upper end of a broad-band telephone channel, and still retain a 2950-cycle voice circuit. Mid-channel carrier frequencies of 3120, 3240 and 3360 cycles are employed. The mark frequencies are 30 cycles below and the space frequencies are 30 cycles above the mid-band frequencies. The three telegraph channels are transmitted in the band 3080 to 3400 cycles, leaving the band below 2950 cycles for the voice channel.

Fault-free teletype circuits are obtained,

even where the telephone circuit on which they are superimposed suffers from noise or abrupt level variations which may be so great as to render on-off keyed signals unintelligible. Frequency-shift signals do not suffer deterioration from non-linear transmission, such as is caused by overloading in voice-frequency, carrier or radio equipment. Under most circumstances a signal-to-noise ratio per channel as low as 20 db is satisfactory, and under some conditions even lower ratios result in fault-free operation. This equipment meets the requirements of current MIL specifications wherever applicable.

## RADIO ENGINEERING PRODUCTS

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MANUFACTURERS OF CARRIER-TELEGRAPH, CARRIER-TELEPHONE AND BROAD-BAND RADIO SYSTEMS

For more data on advertised products, use coupon, page 67

# Management With Intercom.

WHEN plans for one of the most amazing plant expansion programs in Canadian history were being prepared for the 500-acre A. V. Roe, Canada, Limited, plant at Malton, Ontario, engineers were called in to assist in the design of a plant paging system and a fire alarm system that would reach out from a central station to any point in the many buildings which make up the Avro plant.

Electronics play a major role in the system that was finally worked out and installed in the plant, with the result that two-way communication is automatically established between the scene of a fire and either the local fire station or the main fire hall of the giant plant.

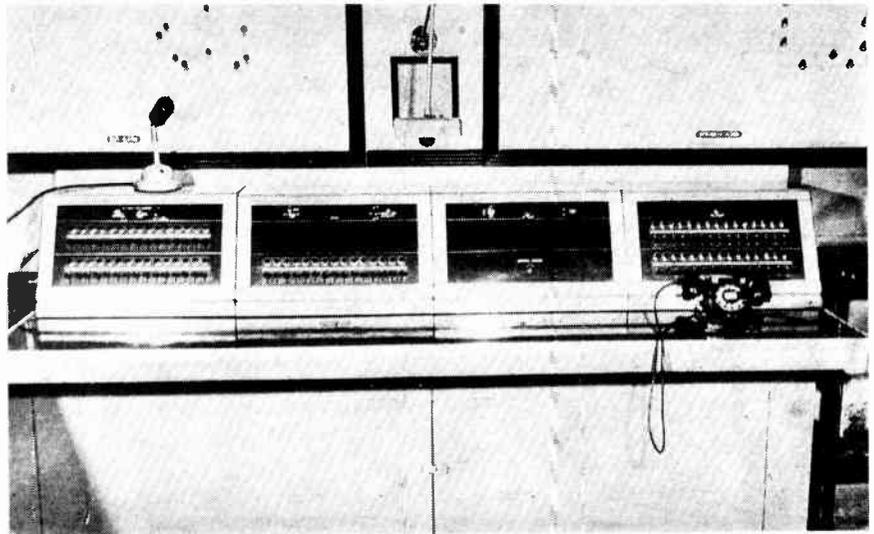
The practical application of the electronic art is proving to be of valuable assistance to firemen in their efforts to protect lives and property, and to plant management, in their never-ending effort to reduce overhead and increase the overall efficiency of their operations.

In the event of fire, both the local and the main fire stations of the plant are alerted. In addition to the audible alarm at each point, visual signals on map boards light up to pin-point the exact location of the alarm box which has been "rung in". Should the nature of the fire require assistance from the main fire station, where the major fire-fighting equipment is stationed, then the intercommunication unit in the alarm box is used to contact the main fire station.

So sensitive is the system that undetected fires automatically turn on the sprinkler system and ring in alarms to the local and main fire halls, where their position is determined from the illuminated map boards.

### Modern Paging System

Because of the size and great distances between the various buildings, some method of locating personnel was considered by Avro engineers as a "must," and a high quality plant paging system was fitted.



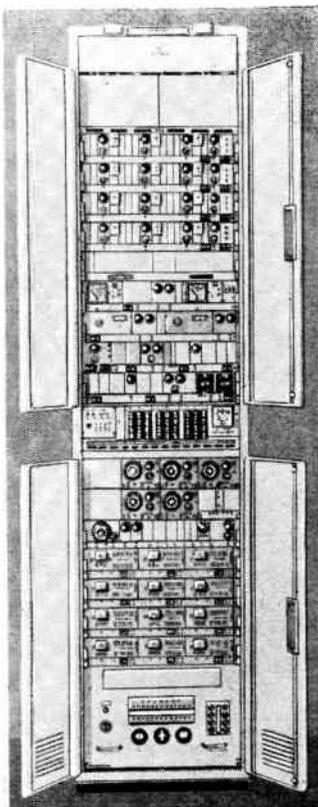
● View of the ultra-modern intercommunication installation providing efficiency and protection for the giant A. V. Roe plant at Malton. The installation was engineered and installed by Engineered Sound Systems Limited of Toronto.

Each building has its own completely independent system for use in directing personnel should an emergency arise, and the same equipment can be used under normal conditions by the telephone switchboard operators in locating personnel in any building.

Because of the physical layout of the various buildings, the system was designed to enable telephone operators to "page" either of two zones, the buildings associated with aircraft

production or the buildings associated with gas-turbine production.

Line amplifiers used to feed the buildings are located in the telephone switchboard room, and are of the modern unitized design. The signal from these pre-amplifiers is fed out at 600 ohms over standard telephone lines to each building, and is used to drive local power amplifiers which, altogether, are capable of producing approximately 1,500 watts of audio power.



### TWELVE-CHANNEL OPEN-WIRE LONG-HAUL CARRIER-TELEPHONE SYSTEM OF ADVANCED DESIGN

This is a 12-channel 2-wire single-side-band carrier-suppressed miniaturized plug-in equipment operating in the band 36 to 143 kc. Six frequency allocations are available. Channel bandwidth is 300 to 3400 cycles. Three of the voice channels may be replaced by a 10-kc program channel. Built-in ringing and dialling facilities are available. Maximum attenuation per repeater section is 74 db and full automatic regulation of transmission variations is provided. Either frogging or non-frogging repeaters are used, and systems of any length can be set up to meet standard toll-transmission requirements, with adequately engineered lines.

This system is assembled from a series of standardized equipment units, which are employed to form universal carrier-telephone systems of from three to 960 channels. Information on these systems will be furnished on request.

●  
Type T12 Terminal complete with test equipment mounts on one side of an 8' 6" bay.

## RADIO ENGINEERING PRODUCTS

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Cable Address: Radenpro, Montreal

MANUFACTURERS OF CARRIER-TELEGRAPH, CARRIER-TELEPHONE AND BROAD-BAND RADIO SYSTEMS

## PLATE DISSIPATION

(Continued from page 21)

- Juggle the grid and plate voltages until the cathode and screen currents are the same as for the dynamic case.
- The plate voltage found above, times the plate current is close to the effective plate dissipation in the dynamic case.

### PRECAUTIONS

- It is essential that the screen voltage be accurately read and repeated because any error here becomes an amplifier error in plate voltage. If the screen voltage has any ac components, then it is not always possible to use this method unless its effect can be evaluated.

### OTHER METHODS

#### 1. Heat Integration Ring:

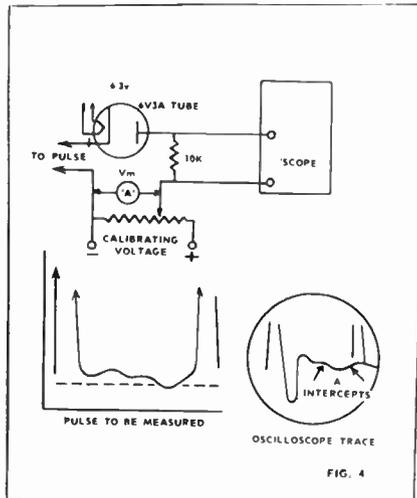
The thermocouple method may be modified to include a heavy brass ring about the tube to integrate the heat coming out of the tube in all directions. This is an improvement in accuracy provided that it does not disturb the circuit.

#### 2. Torsch Calculation:

This method applies to Television horizontal output circuits. If the transformer turns ratio and resistances are known and a few operational measurements made, a few calculations can be made to arrive at an approximate value of the plate dissipation. For details of this method see Tele-Tech, January, 1950. It does require quite an understanding of the circuit operation or large errors may result. The method is very useful in rapidly calculating the effect of a minor change in the circuit.

### 3. Waveform Analysis:

This method is very useful for triode TV vertical deflection circuits. The waveforms of plate voltage and current are obtained from an oscilloscope having a dc amplifier. Then a suitable number of intervals in the cycle are taken for calculating the average plate dissipation.



#### • Diode Clipper for High Pulse Voltages.

#### 4. Diode Clipper:

This method is an adjunct to the Waveform Analysis. In cases where the pulse voltage on the plate is excessive for an oscilloscope, such as in the TV horizontal output stage, a biased diode such as in Figure 4 may be used to find the actual plate voltage at any point in

the cycle.

The above case was also done by Waveform analysis using a diode clipper and the value obtained was 13 watts. There was a 27 volt ripple on screen voltage not taken fully into account when the dc substitution method which would make the plate dissipation calculation higher. The Thermocouple value is thought to be the most reliable.

This example serves to illustrate the importance of measuring the plate dissipation. In this case the rated plate dissipation of the tube was 11 watts but the measurements showed that it was operated at 15 watts. As a consequence, field trouble was experienced due to the top cap solder melting and rather short tube life.

#### EXAMPLE RESULTS FROM A TYPICAL CASE:

Conditions: TV Receiver at 117 volts line, normal width, brilliance and contrast controls at minimum. The tube under test was a 25BQ6GT in the horizontal output circuit.

#### For Increased Welding Efficiency

Of particular significance to the paint departments of those engaged in the manufacture of refrigerators, tables and chairs, water heater jackets and automobile hood and fender repair shops is a reciprocating disc type atomizer which is reported to vastly improve electrostatic spray painting techniques. The disc unit operates in an electrostatic field generated by placing the disc at 190 kv. and holding the parts to be sprayed at ground potential on the travelling conveyor.

The process is claimed to be clean, fast, and deposits a strong uniform coat of paint.

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#### T.C.C. Sub-Miniature Electrolytics

are designed for special applications such as transistor circuits, etc., where extremely small size is of importance. Hermetically sealed and either "plug pin" or wire terminals supplied in a varied range of sizes and capacitances.



(Actual Size)

#### Picopack Electrolytics:

85° Rating.  
Hermetically sealed.  
Plastic insulating sleeve.  
Miniature dimensions.

THE TELEGRAPH CONDENSER COMPANY has since 1906 specialized in the manufacture of Condensers. Their ONE product is Condensers. The concentration of thought and effort on this ONE product and its many different types has played a considerable part in achieving the success that has made the name T.C.C. famous wherever Condensers are used.

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**THE STATIONMASTER**  
Desk or wall mounted utility fixed station with power output up to 60 watts.

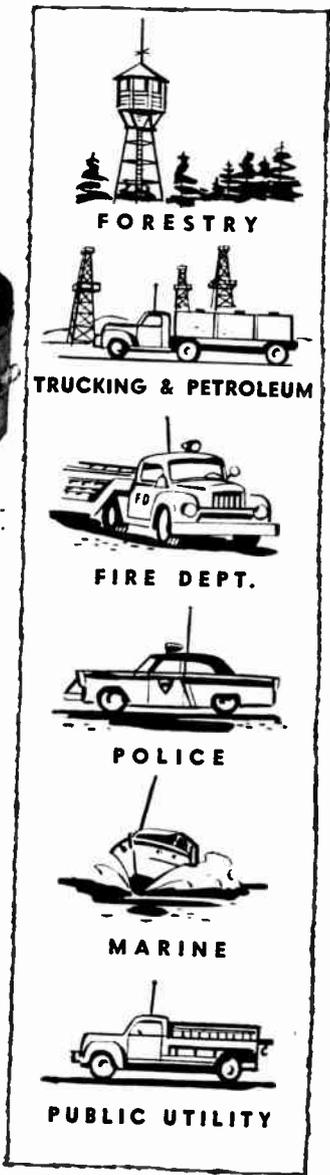
**THE POWERMASTER**  
250-watt, fixed station.

**THE TRAFFICMASTER**  
Mobile unit . . . power output up to 40 watts.

**THE MULTIMASTER**  
Portable, completely self-contained base station. Power output from 2.5 to 60 watts.

**PORTABLE PACKET**  
Single or dual channel 1-watt, weight . . . 8 pounds.

**5 TYPES OF 2-WAY FM RADIOS TO SELECT FROM**



**Bendix-Radio** engineers have developed the **COMMAND-AIR** series to provide industry with consistently reliable communications. Incorporating the very latest in electronic design, this new communication system is the result of 6 years of constant research, experimentation, and field tests.

**Outstanding features of the COMMAND-AIR series are:**

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- ▶ Crystal controlled . . . choice of either single or dual channel 2-way conversation.
- ▶ Ruggedness

FM systems are available for operation on 25-50 or 152-174 megacycles.

No need to accept substitutes . . . Bendix-Radio has a unit to fit the job. Whatever your requirements, it will benefit you to request further information. Write to: 200 Laurentien Blvd., Montreal.

AE-55-1

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MONTREAL LIMITED VANCOUVER

## Industry

Depressed By Competitive Prices Of Imported Textiles  
Canadian Producers May Now Reduce Production Cost  
Of Textile Manufacturing By Electronic . . . .

# Textile Testing

● The Picker Lap Tester.

THOUGH business conditions on the Canadian scene have been generally good during the post war years there are industries within the Canadian economy that have not been as fortunate as others. One of the less fortunate is the textile industry the domestic market for which has been considerably undermined by imported products which can be sold at a lower cost on the Canadian market than our own domestic products. Main

contributing reason for this situation is that the labor cost of imported goods is less than that of the Canadian article.

First problem to be solved by management of the Canadian textile industry if it is to compete with the imported product is to reduce production costs. This may now be accomplished to some degree by the recent development of an electronic device which promises the solution of one of the

most troublesome and costly problems in the textile industry. The instrument, known as the "Picker Lap Tester" was designed to enable the continuous measurement and control of both longitudinal and lateral lap thickness.

### *Expensive Techniques Outmoded*

Until this testing machine was developed, lateral weight measurement was confined solely to expensive laboratory techniques. Also, longitudinal lap weight measurement has always been made on a yard-to-yard basis which fails to take within-yard lap variations into consideration.

In contrast, the Picker Lap Tester measures weight variations continuously in both directions while the lap is being processed. The instrument is mounted permanently on the picker and indicates actual weight, minus moisture, on meters. Lap unevenness and weight may also be permanently registered by use of a recording device.

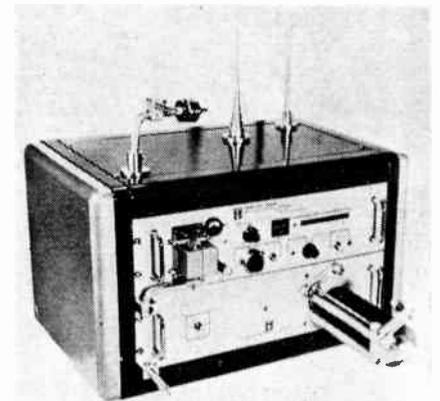
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If you have a problem of a kind which does not appear to fit usual financing practice you might find it worthwhile to learn what the Industrial Development Bank can do.

I.D.B. has wide experience in industrial problems. Its methods of financing can be adapted to fit unusual circumstances. I.D.B. analysis of an industrial problem has often produced a solution which either makes regular commercial financing feasible or paves the way for a direct I.D.B. loan. If you are interested we suggest that you enquire of your bank, legal adviser or auditor, or write for information to:

### INDUSTRIAL DEVELOPMENT BANK

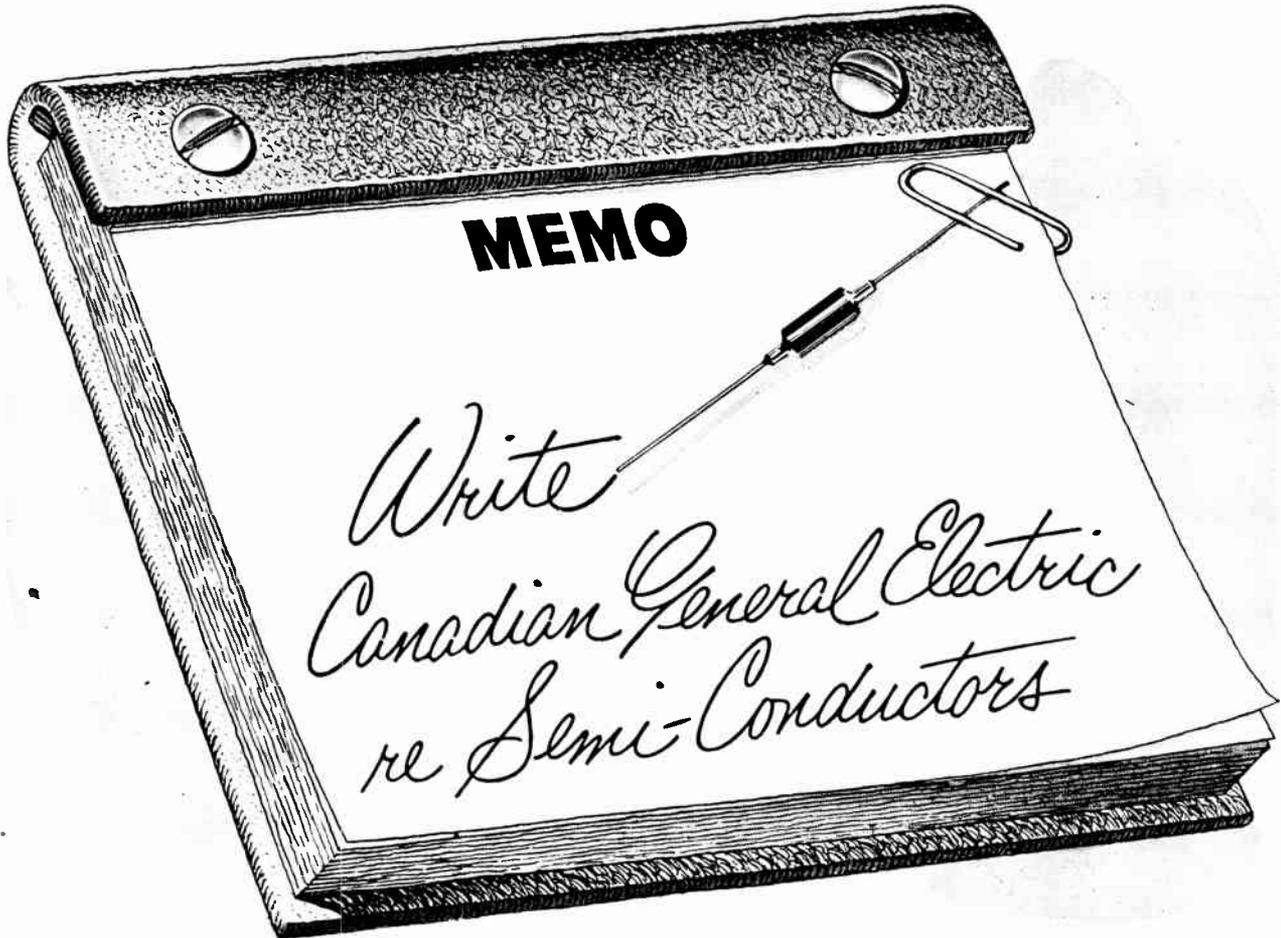
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901 Victoria Sq. 85 Richmond St. W. 195 Portage Ave. E. 475 Howe St.



● The Imperfection Counter

In operation, three measuring rollers pass over the lap in both directions while the lap is brought into contact with the lap as it passes over the calendar roller movements which are converted into electrical signals. Since each roller is connected to a separate meter, with or without the recorder, any variations shown by an individual meter will indicate corresponding longitudinal variations in lap weight. Any variations shown by comparing the meters with

(Turn to page 56)



## SO LIGHT, SO SMALL, YET SO EFFICIENT

Now made in Canada by C.G.E.

Make a note to get all the facts about these miniature but magical devices known as "semi-conductors." They are among the most amazing of recent developments in electronics, and are now made in Canada by Canadian General Electric Co. Ltd.

Semi-conductors have effectively replaced other products many times their size. Their long life and outstanding performance makes them useful in a variety of applications, such as telephone circuits, radio, television and record players. In calculating machines, controls and

other equipment, they prolong equipment life—make entirely new functions possible.

Contact your nearest C-G-E office for detailed information or write to: *Electronic Tube Marketing, Canadian General Electric Co. Ltd.*



# SEMI-CONDUCTORS

TRANSISTORS • DIODES • RECTIFIERS

*Electronic Tube Marketing Section*

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77-576W-554

## ELECTRONIC TELEPRINTING

(Continued from page 24)

This device can work multiplex so far developed up to three channels in which case the effective total working speed is increased to 360,000 words per minute maximum (due to present mechanical limitations, but electrically to 720,000 words per minute). The entire System is controlled by a single low frequency oscillator which is the only master control to govern the speed of both transmitter and receiver from 10 to 360,000 words per minute and is set similar to the volume control in a radio receiver. If the frequency of this master oscillator drifts the entire system follows the drift. This is due to employing novel methods of frequency division and multiplication and converting the sine waves to other shapes of waves in non-frequency sensitive circuits. For example, a phase difference of 90 degrees is maintained constant over the range of the lowest frequency possible to generate up to four megacycles.

### World's Fastest Printing System

The Teleprinter Signals can be magnetically recorded on iron dust paper, which may be folded and sent by ordinary post. It is impossible to break the secrecy of such a recording, because the secrecy is governed by the knowledge of the nature of recording, the knowledge of the language and the order of the characters of the language on the master stencil.

On a 10-inch grammophone disc as many as 21,000 words can be recorded, whereas the spoken matter can not be

more than 600 words long.

Considering the printer individually as an invention the System employs a special electronic tube, like a cathode ray tube, fitted with an electron permeable window through which a beam of electrons is shot out into the air. When this beam hits a chemically treated paper, which is substantially white and bone dry, a mark of greenish black color results. In digital computer service this System is capable of recording one microsecond pulses with a current of the order of about  $\frac{1}{2}$  micro-ampere. It is believed that it is the fastest printing system in the world.

## COMPONENT COMMITTEE

(Continued from page 19)

negotiations, particularly as the contractor usually must consider the creation of the necessary facility at his plant as well as the actual development requirement. For this reason, contract action has been initiated for about only one quarter of the total program to date.

Some of the more interesting projects relating to electron devices include improvement in the life of hydrogen thyratron tubes and the development of reliable tubes, subminiature germanium diodes and magnetrons.

Activities concerned with parts and materials include the improvement of fixed composition resistors, the development of miniature high temperature variable composition resistors,

tantalum capacitors and variable vacuum capacitors.

Aside from its own specific projects, the Electronic Component Development Committee notes relevant Canadian investigations of a more fundamental nature. In this connection, mention should be made of the valuable current work on long life cathodes at the National Research Council. A group, directed by Mr. P. A. Redhead, is carrying out the research.

An NRC group is also investigating silicon transistors.

Professor G. A. Woonton, Director of the Eaton Electronic Research Laboratory at McGill University, has begun research on travelling wave tubes and semi-conductors, both items with important defense applications.

At the Defense Research Telecommunications Establishment in Ottawa, the components group is being built up gradually to carry out specific investigations. The staff will play as well an expanding role in the Committee's program both at the technical level and in an advisory capacity.

The foregoing will give some idea of the scope of this component program and the extent to which the Canadian electronics industry is expected to participate. It is hoped that such participation will serve to create industrial facilities fully capable of meeting Armed Service demands for development and production of the newest types of electronic components.

## AUTOMATIC BROADCASTING

(Continued from page 26)

record enough announcements for a regular eight-hour shift in an hour or two, since he does not have to wait through the actual playing of the program material. His additional time can be used to increase the station's revenue, either by extending the broadcast day or by helping the commercial staff sell time. Announcers would no longer be required to work late hours or holidays.

Program quality can be greatly increased by the use of the system, according to engineers. Since the equipment can be located right at the transmitter, limitations in fidelity imposed by telephone line connections between studio and transmitter are removed. Program content would also be improved, since most program material would be prepared by networks and transcription services financially able to hire top production men.

The manufacturer anticipates that regional networks may be among the first users to realize fully the advantages of the system. They would be able to prepare programs a few days in advance and mail them to member stations. Local programs could be prepared by each station and automatically co-ordinated with those from the network headquarters.

Independent stations would benefit primarily by being able to extend their broadcast schedules, and thus their revenue, without adding to their staffs.

# WANTED

## SENIOR ELECTRONIC ENGINEERS, PHYSICISTS and TECHNICAL SPECIALISTS IN ELECTRONICS

Canadian General Electric Company offers positions in Design and Development Work in the fields of Radar, Microwave Communications, Telephony, Radio and Television Broadcast Equipment.

To senior men these positions offer a challenge to their knowledge and ability and an opportunity to establish themselves and grow with a rapidly expanding department.

There are also positions open to junior men keenly interested in the electronics field. These men are given the opportunity to gain experience and extend their knowledge by becoming part of an outstanding engineering team which has pioneered in many Canadian electronic developments.

Salaries are attractive and commensurate with experience. Pension, Health and Accident and Group Life Plans are in operation. All inquiries held in absolute confidence. Call OL. 6511, Local 429 or write to:

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# News

## G. F. Bates Joins Bach-Simpson Sales Staff

Bach-Simpson Limited, London, Ontario announce the appointment of Mr. G. F. Bates as Sales Manager.



G. F. BATES

Mr. Bates brings to this position extensive training and experience in the fields of electronics and communications. During the war, Mr. Bates served as Commanding Officer, West Coast Radar Installations and as

Senior Technical Officer, OBOE Radar, England. In the industrial field, Mr. Bates has been associated with Cossor (Canada) Limited and the Commercial Products Division of the Canadian Marconi Company in Sales Executive capacities.

## Electronics And Communications Editor Visits England And Continent

Leslie L. Hill, Ph.D., contributing editor of Electronics and Communications, is at present in England for the purpose of clearing up outstanding details remaining from his previous stay in Egypt. During his visit to England he will take the opportunity to visit Germany, Holland, France and Switzerland to acquaint himself with the latest achievements in the field of electronics in these countries, especially developments in the sphere of audio devices. Dr. Hill's visit to the United Kingdom and the Continent will be of short duration, as future plans call for his attendance at the I.R.E. Show in New York from March 21st to March 24th.

## Atlas Radio Corp. Move To New Premises

The receiving and shipping departments of Atlas Radio Corp., Limited, have recently moved to the firm's new premises at 50 Wingold Avenue in Toronto and it is anticipated that the office staffs and the manufacturing departments will move into the new building at an early date.

The new ultra-modern one-storey steel and brick fireproof structure built on three acres of land provides approximately fifty thousand square feet of floor space devoted to offices, development laboratories, engineering, production and warehouse facilities.

## Kellogg Intercommunications Now Coast-To-Coast

Appointment of six new franchise dealerships in Canada for the sale of Kellogg Intercommunication Systems has been announced by Carl F. Megehin, Assistant Sales Manager, Kellogg Switchboard and Supply Company, Chicago. The new franchise dealers are as follows: Baldwin International Limited, 3006 Bloor Street West, Toronto 18, Ontario, Canada; Canadian Algor Limited, 354 Princess Avenue, London, Ontario, Canada; Interprovincial Sales Limited, P.O. Box 1073, Barrington and Buckingham Streets, Halifax, Nova Scotia, Canada; George M. LaTour, 1530 Third Avenue, Quebec, Canada; Ottawa Typewriter Company Limited, 194 Laurier Avenue West, Ottawa, Ontario, Canada; O. M. Grieg & Company, 3712 Main Street, Vancouver 10, British Columbia, Canada.

## Aerovox Takes Over Henry L. Crowley and Company

James Kay, General Manager of Aerovox Canada Limited, has announced the acquisition by Aerovox Corporation of all the outstanding stock of Henry L. Crowley and Company Inc., of West Orange, New Jersey, manufacturers of powder-irons and steatite products.

Henry L. Crowley & Company was organized in the early 1920's by Dr. Henry L. Crowley, who pioneered the company's development of low-loss ceramic dielectrics, iron cores, and other parts from powder. Today its product line ranges from iron cores and microwave components to ceramic-permanent magnet bodies, with applications in the fields of radio-television, automotive, electrical and electronics.

Besides their modern plant at Hamilton, Ontario, Aerovox Corporation, a leading electronic component manufacturer, operates plants in New Bedford, Mass., Olean and Franklinville, N.Y., Myrtle Beach, South Carolina; Burbank and Monrovia, California.

## K. R. Rickey Elected V.P. Lenkurt Electric Company

Kenneth R. Rickey has been elected a vice president of the Lenkurt Electric Co., San Carlos, Calif., and of Lenkurt Electric Co. of Canada, Ltd., Vancouver, B.C.

Rickey is controller of Lenkurt, which manufactures telephone and telegraph carrier equipment, microwave radio systems and electronic components.

Rickey, a former Chicago business executive, joined Lenkurt in 1953 as financial co-ordinator. He was appointed controller later that year and was elected to the board of directors early in 1954.

## Department of Transport Considering New Service

A back-log of applications for licenses for the operation of private land mobile radio communications systems from private individuals and companies has led the Department of Transport to consider authorizing the operation of a new public radio service in Canada. It is understood that the official name of the new service will be the "Restricted Common Carrier Mobile Radio Service". Its main function will be to provide a means for the direct control of vehicles as well as the establishment of a message relay and telephone answering service for the mobile stations. It is possible that a radio paging service for the system may also be provided.

## Naresco Corporation Appoints Canadian Representative

Measurement Engineering, Ltd., has been appointed Canadian sales representative by Naresco Equipment Corporation, equipment sales subsidiary of National Research Corporation. With headquarters in Arnprior, Ontario, and a branch at 226 Donlea Drive, Toronto 17, Ontario, Measurement Engineering will sell the entire line of high vacuum equipment manufactured by the Equipment Division of National Research Corporation, 160 Charlemont Street, Newton Highlands 61, Massachusetts. Featured in this line are high capacity mechanical and diffusion pumps, vacuum coaters, vacuum furnaces, and vacuum gauges, valves, and seals.

## Paul H. Robbins Addresses Ontario Professional Engineers

The successful defense of Canada and the United States in the event of a third world war depends upon the continued high technological development of the two nations, Paul H. Robbins, Washington, D.C., told more than 1,000 members of the Association of Professional Engineers of Ontario at its recent annual meeting in Toronto.



P. H. ROBBINS

Robbins is executive director of the National Society of Professional Engineers, the policy-making body for 34,000 U.S. engineers in 39 states.

In addition to its important role in national defense, the technology was also responsible for maintaining the present high level of economy enjoyed by Canada and the U.S.

(Turn to page 36)

## NEWS

(Continued from page 35)

## NATO Countries In Need Of Electronic Engineers

NATO countries, it has been made known by the Department of External Affairs, is in need of electronic engineers to act as consultants in some of the NATO countries. Department of Defense Production officials have been asked to make this requirement known and assist in obtaining the services of engineers who may be interested.

## Westinghouse Names Management Appointees

Appointments to new branch management posts have been announced for two well-known Canadian Westinghouse men by District Apparatus Division General Manager E. E. Orlando.

J. H. Goar, formerly a sales engineer at Windsor, has been named Manager of the division's Niagara branch with headquarters in Hamilton. He succeeds R. T. Houlihan who has been appointed Branch Manager at London.

Succeeding Mr. Goar as Sales Engineer at Windsor is C. S. Cranton.

## A. H. Sievert Named Manager Westinghouse Tube Division

A. H. Sievert has been named sales manager for the Canadian Westinghouse Company's newly-formed Tube Division in Hamilton. Reorganization of the firm's Lamp-Tube Division into two separate units was recently announced by L. A. McCalpin, who will head up both operations as general manager.

Mr. Sievert has been with Westinghouse for almost 20 years, having joined the company in 1935 upon graduation from the University of Toronto with a B.A.Sc. degree in electrical engineering. Since then, he has been continuously associated with lamp and tube operations in production, engineering and sales capacities.



● Monty Bridgman, Managing Director of PSC Applied Research Limited, 1500 O'Connor Drive, Toronto, has announced the appointment of Manley F. Haines to the Board of Directors. Mr. Haines, Production Manager of PSC Applied Research Limited, has been responsible for the organization of the Production Division now assembling a wide variety of complex aircraft instruments. The latest of these is the R Theta navigational device for the RCAF.

## Western Association Of Broadcasters Meet In Calgary

The fifth annual convention of the Engineering Section, Western Association of Broadcasters will be held in the Palliser Hotel, Calgary, from February 23rd to 25th. It is anticipated that about 70 members of the Association will attend, comprised of technical personnel from radio and television stations extending from the head of the Great Lakes to Victoria.

Papers dealing with new developments in television and radio broadcasting will be presented by the leading electronic manufacturing firms of Canada as well as technical papers concerning broadcasting problems which will be presented by station engineers attending the meeting.

(Turn to page 38)

**DUBILIER DRILITIC CAPACITORS**  
for the SERVICE ENGINEER

AVAILABLE IN A WIDE RANGE OF CAPACITANCES AND VOLTAGES

UP-TO-DATE ELECTROLYTIC CAPACITORS OF PROVEN PERFORMANCE

DUBILIER DRILITIC CAPACITOR  
CAT. NO. BR250

DUGON WORKS, VICTORIA ROAD, NORTH ACTON, LONDON

Here are the electrolytic capacitors that are outselling all other makes. In Canada, the largest TV and Radio set manufacturer

imports more DUBILIER capacitors than all other makes combined.

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**DUBILIER CONDENSER CO. (1925) LTD.**

*Maker of the World's Finest Capacitors*

Canadian Sales Office:

**ASTRAL ELECTRIC CO. LIMITED**

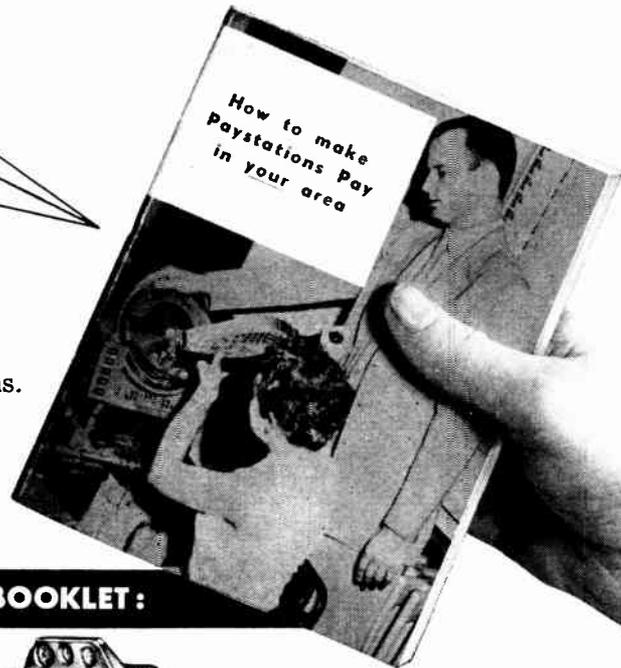
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make profits for you  
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Here's a handy, illustrated booklet for you on request . . . absolutely free! It contains important information on the purchase, operation and maintenance of paystations. It tells you how Autelco Paystations can increase good-will and profits in your community.



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Selection of Proper Equipment  
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● Shown above from left to right while attending the Welwyn Canada Limited-I.B.M. meeting are J. R. Bach and R. Wilton of Welwyn Canada Limited consulting with Mr. E. C. Taylor, Mr. H. F. Heath, Jr., and Mr. W. E. Smalley, all of International Business Machines, Poughkeepsie.

### Welwyn Canada Limited And I.B.M. Officials Meet

Officials of Welwyn Canada Limited —manufacturers in Canada of the Welwyn High Stability Carbon Resistor — recently entertained representatives of the International Business Machines Corporation of Poughkeepsie, New York.

The increasing requirements for highly stable resistive components in present day electronic office and calculating equipment prompted the

visit, to survey the facilities offered by the Canadian plant and to discuss the many engineering phases of the continuing application of Welwyn resistors to International Business Machines Corporation.

It is a tribute to I.B.M.'s outlook on international trade that they are interested in increasing their usage of a Canadian-made component for U.S.-produced equipment.

### CEA Communications Section Meet At Niagara Falls

Mr. C. W. Boadway, Ontario Hydro Electric Power Commission was proposed and nominated to succeed A. S. Runciman, retiring Chairman of the Communications Section of the Canadian Electrical Association at the 1955 Annual Meeting held in Niagara Falls, January 25th, last. Mr. Runciman will vacate the position of Chairman of the Communications Section at the C.A.E. Annual General Meeting to be held in June.

Mr. W. H. Holroyd of Communications Consultants Limited, Toronto, was nominated at the Niagara Falls meeting for the Vice-Chairmanship of the Communications Section. Mr. Holroyd's nomination will be ratified at the general meeting in June.

A comprehensive agenda covering the communications field in Canada was dealt with at the January 25th meeting. Among the speakers at the meeting were: C. W. Boadway, Ontario H.E.P.C.; C. H. Busby, Aluminum Company of Canada; Robert Long, Toronto Hydro Electric System; Mr. O. Kreis, Brown Boveri (Canada); C. Humphreys, Montreal Engineering; W. A. Cole, Canadian General Electric; George Burrige, Ontario H.E.P.C. and Mr. Duchastel, Quebec Power.

(Turn to page 41)

For engineers . . . servicemen . . . amateurs . . . students



### The P-3 Pocket-Size AC-DC Multimeter

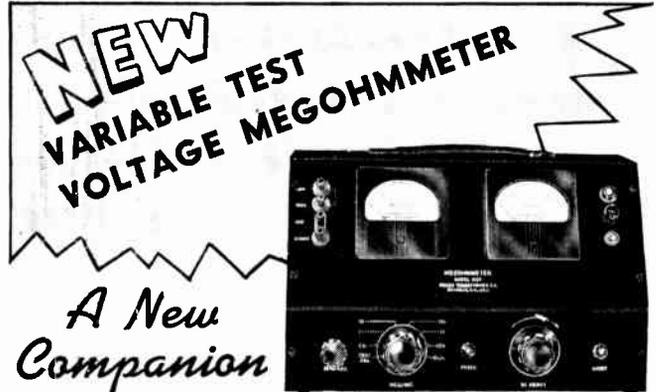
The P-3 is one of the most compact multimeters ever designed. It measures only  $4\frac{3}{4}'' \times 3\frac{1}{2}'' \times 1\frac{1}{2}''$ . High sensitivity microampers movement and highest quality components give a degree of accuracy and dependability seldom before achieved. Ranges: AC-DC 0-5, 25, 250 and 1000 v. DC current, 0-1, 10 and 10 MA. Resistance 0-10K and 100 K ohms. Grey metal case. Bakelite cabinet. Fully guaranteed . . . and offered at an amazingly low price.

- 1000 ohms per volt on both AC and DC.
- Full size 3" rectangular meter.
- 1% precision resistors.
- Supplied with test leads.

only **\$13.90** complete!

Genuine leather carrying case \$3.95

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*A New Companion*

### to the Industry Accepted 1020-B MEGOHMMETER

The Freed Type 1620 is a versatile insulation resistance measurement instrument with a continuously variable DC test potential from 50 to 1000 volts.

Components such as transformers, condensers, motors, printed circuits, cables and insulation material can be tested at their rated voltage and above, for safety factor.

- Resistance — 0.1 megohms to 4,000,000 megohms.
- Voltage — variable, 50 - 1000 volts.
- Accurate — plus or minus 5% on all ranges.
- Simple — for use by unskilled operators.
- Safe — high voltage relay controlled.

SEND FOR COMPLETE TRANSFORMER AND INSTRUMENT CATALOGS.

**FREED TRANSFORMER CO. INC.**

1716 WEIRFIELD ST., BROOKLYN (RIDGEWOOD) 27, N.Y.

For more data on advertised products, use coupon, page 67

**cae**\* *electronics serve*

- Agriculture
- Aviation
- Mining
- Manufacturing
- Medicine
- Shipping

Equipment and Systems for:—

Multi-Channel  
Microwave/Communication  
Systems

Flight Simulators

Nuclear Instruments

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Aviation Communication Systems

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Radar Systems

Search and Rescue and Homing  
Equipment

Automatic Flight Control Systems

Protection Systems

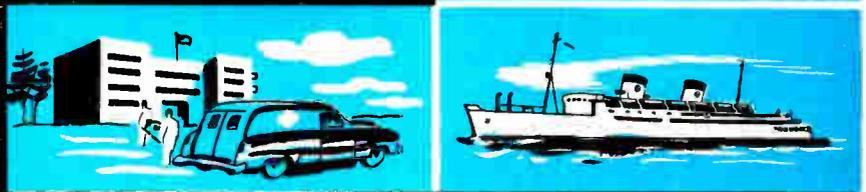
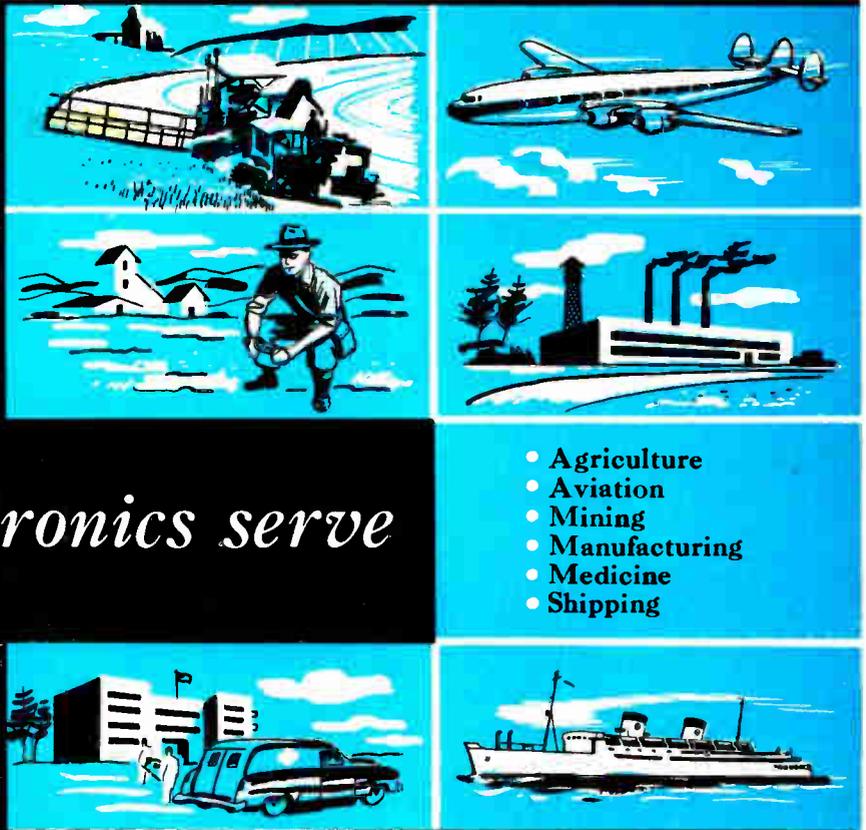
Hydraulic and Pneumatic Cylinder  
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**CAE CONSUMER PRODUCTS**

*Dumont Television*  
*Ariston Products*

**cae**



*with* **FACILITIES FROM COAST-TO-COAST**

The science of electronics is one of the major contributors to Canada's unprecedented economic expansion. Almost daily the electronics industry is discovering and developing more efficient and more economical means of performing many vital functions on land, at sea and in the air. Canadians everywhere are enjoying a higher standard of living and a more secure future through the practical application of electronics to every walk of life.

In skilled personnel, in modern precision equipment and in practical experience, CAE is qualified to undertake a wide variety of assignments in practically every phase of electronics.

*cae specialists are readily available for consultation  
on your electronic problems*

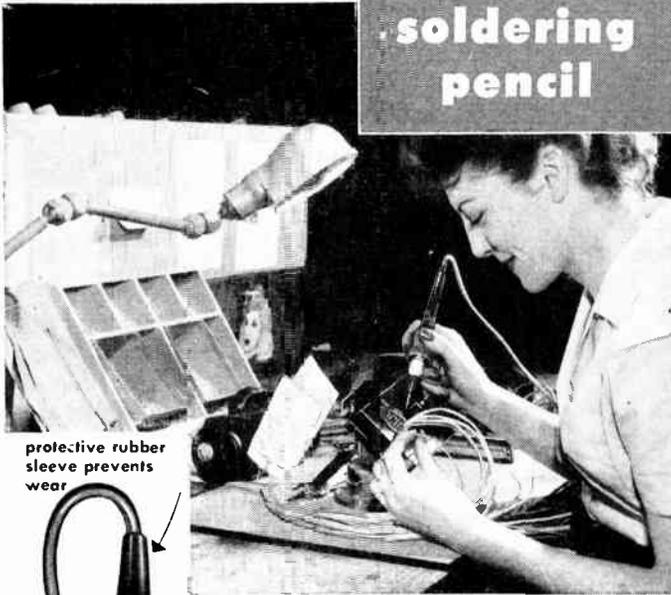
**\* CANADIAN AVIATION ELECTRONICS, LTD.**

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THE LARGEST CANADIAN-OWNED ELECTRONICS COMPANY

**get greater efficiency on small jobs...use**

**the Ungar electric soldering pencil**



protective rubber sleeve prevents wear



costs 1/3 less to operate!

Mrs. Joan Simpson of A. V. Roe Canada Limited using an Ungar-Electric Soldering Pencil to solder electrical connector assemblies for the CF-100.

Feather-light, but really rugged, the Ungar Electric Soldering Pencil can be used for all standard soldering. It is especially suitable for the aircraft industry . . . because it gets into *hard-to-reach places* easily — and does the job quickly! You can count on it to last longer, too . . . for the Ungar heating units are built to give you hundreds of hours of extra life. Add to this the inexpensive, easily changed Elkaloy Tipllets and you'll save time and money all round!

**CHECK THESE BIG FEATURES:**

- Full length tinsel cord.
- New, cooler handle of durable molded plastic (patent applied for).
- Seven interchangeable tips. Ample copper heats to 600° in 90 seconds.
- Ceramic separators for double safety.
- Spring action rivet assures positive contact at all times.
- Extra length brass shell firmly engages all threads. Keeps heating unit tight.
- Fully CSA approved Seal on complete pencil set.
- 20 watt element. 1000 hours operation 21c. 110-120 volt, A.C.-D.C.



SEE YOUR JOBBER

5303

**ELECTRIC TOOL CO. OF CANADA**

44 DANFORTH ROAD  
TORONTO 13, CANADA

For more data on advertised products, use coupon, page 67

*Miniature and sub-miniature*



multiple contact

**CANNON PLUGS**

DPM-14

for diminutive applications

Turn to Cannon when you want midget connectors!

Type DPM-14 illustrated has 2 (10 amp.) No. 16 and 12 (5 amp.) No. 20 brass contacts. Entire assembly only 3/4" x 2". Similar unit, Type DPM-A20 has 2 No. 16 and 18 No. 20 contacts. Ideal for rack, panel, and instrument applications.

You get positive contact, rugged, rectangular mounting assembly, Cannon high quality performance, with or without shell support. Types D, U, and miniature K's . . . all in extremely small space.

Write TODAY for Bulletins covering all the lines of Cannon Miniature and Sub-Miniature Connectors.

CANNON ELECTRIC CANADA LIMITED  
160 BARTLEY DRIVE,  
TORONTO 16, ONT.

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**CANNON ELECTRIC** Since 1915



*Latest developments . . . including COLOR!*

**TELEVISION, Second Edition**

The Electronics of Image Transmission in Color and Monochrome

By V. K. Zworykin and G. A. Morton, both of RCA Laboratories. Completely revised and expanded by 60%. Now includes a detailed discussion of the theoretical and practical aspects of color television, and a comprehensive analysis of industrial TV.

Gives extensive coverage to camera tube and cathode ray presentation tube. Provides necessary physics, data on practical construction and operation, and the analysis of processes involved in the picking up and presentation of images. 1954. 1037 pages. 728 illus. \$17.50.

for sale by

**AGE PUBLICATIONS LIMITED**  
31-35 Willcocks St. Toronto 5, Ont.

## NEWS

(Continued from page 38)

### Minnesota Mining Loses Valued Employee In Death Of Evans Newcomb

Evans Newcomb, 55, recognized as one of Canada's leading authorities on coated abrasives in the metalworking, automotive, electrical and aircraft industries, died suddenly January 2nd at his home in London, Ont. He was general sales manager of the abrasives and adhesive products divisions, Minnesota Mining and Manufacturing of Canada Ltd.



E. NEWCOMBE

Mr. Newcomb was born in Farrell, Idaho, and educated in England, but 25 of his 30 years' service in the sale of abrasives with 3M and associated companies were spent in Canada. He played an important part in assisting the metal-working industry with conversions to coated abrasives, particularly in the post-war period of expansion and introduction of new manufacturing methods.

### Second Annual Canadian Room To Be Held During I.R.E. Show And Convention

The second annual Canadian Room in Suites 112-114 of the Commodore Hotel, New York will be held during the four days of the Institute of Radio Engineers National Convention and I.R.E. Show, March 21st to March 24th, and will again provide a common meeting ground for Canadian visitors to the Show and Convention.

Last year more than 250 Canadians engaged in the electronics and communications industries visited the Canadian Room in the Hotel Commodore. In addition, many American officials of firms engaged in the industries visited the room to meet their Canadian representatives. It is anticipated that this year's attendance at the Canadian Room will greatly exceed that of last year.

Members of this year's Canadian Room Committee are: D. J. Dalzell, P.S.C. Applied Research Limited, Toronto; Bill Deacon, Adams Engineering Limited, (Toronto Branch); P. J. Heenan, P. J. Heenan Limited, Toronto; E. G. Lomas, Ottawa; D. H. Peacock, Computing Devices of Canada Limited, Ottawa; R. W. Peirce, Sperry Gyroscope Company of Canada Limited, Montreal; Jerry Pointon, Charles W. Pointon, Toronto; and John S. Root, R-O-R Associates Limited, Toronto.

### R. Muniz Addresses Toronto Section, I.R.E.

The "Problems Of Television Receiver Manufacturing In Canada" was the subject of an address given to the Toronto Section of the I.R.E. at its January 31st meeting. The speaker, Mr. R. Muniz of the Canadian Westinghouse Company, pointed out that the volume of sales in Canada as compared to that of the United States was one of the reasons for the higher cost of sets in this country. Economic conditions in Canada also influenced the decision as to whether parts should be made or bought. Mr. Muniz pointed out that when components are bought they represent 75 to 80 percent of the cost of the finished set.

Other factors discussed by Mr. Muniz concerned the many fringe areas of reception in Canada and the fact that there is not, as yet, complete standardization of the signals emitted by transmitting stations. The speaker, however, did not hold a pessimistic view of the situation, pointing out that the Canadian market was only 43 percent saturated as compared with about 70 percent in the United States. Furthermore, costs could be reduced at the present time by about 8 percent by the use of printed wiring and a further cut of about twenty percent could be made by mechanical pacing of the production lines.

### G. Fred Eaton Appointed To Erie Resistor Sales Staff

The appointment of G. Fred Eaton as Sales Manager of Erie Resistor of Canada, Ltd., has been announced by Allen K. Shenk, Vice-President in Charge of Sales of the parent company, Erie Resistor Corporation, Erie, Pa., U.S.A.

Mr. Eaton is well known in the radio industry throughout Canada. He comes to Erie from the Canadian General Electric Co., Ltd., where he was Manager of Mobile and Aviation Radio Sales. From 1946 to July, 1952, Mr. Eaton was in the mobile



F. EATON

broadcast sales department of Canadian Marconi, Limited, in Montreal. Prior to his service in the Royal Canadian Navy during World War II, he was in the laboratory of Research Enterprises, Ltd., in Toronto.

The new Erie Resistor of Canada, Ltd., sales offices are located at 4972 Dundas Street West, Toronto 18, Ontario, Canada.

(Turn to page 52)

## Super HI-HEAT SOLDERING TIPS

Here you'll find everything you'd expect from a big, bulky 100-150 Watt iron—plus feather lightness. When you thread a Super Hi-Heat into the pencil slim Ungar Handle a searing 850 to 1000° of actual tip temperature is at your command.

## NO. 4033



**Super Hi-Heat No. 4033 Chisel Tip**  
For all types of soldering operations on production lines and service and repair. Also for AN connectors. 1½" long, tip ¼" wide. Tellurium copper base is plated with iron and pure silver for easy tinning. 900 degrees F. tip temperature. 47½ watts, 115 Volts, AC-DC.

## NO. 4035



**Super Hi-Heat No. 4035 Heating Unit**  
Designed especially for use with Elkaloy Tiplets Nos. 331, 332, 333. Ideal for germanium diodes, resistor wiring and AN connectors. 47½ watts, 115 V, AC-DC, delivers 850 degree tip temperature to tiny Elkaloy tiplets. Iron base chrome plated for corrosion resistance. ¾" diameter.

## NO. 4036



**Super Hi-Heat No. 4036 Pyramid Tip**  
Designed for extra heavy duty soldering, work on heavy wire-wrapped joints, hermetic sealing, heavy ground joints, all operations formerly requiring 150 watt irons. ¾" diameter, 1½" long. Special iron plating over Tellurium copper, coated with pure silver, 1000 degrees F. tip temperature, drawing 47½ watts, 115 V, AC-DC.

## NO. 4039



**Super Hi-Heat No. 4039 Heavy Chisel Tip**  
The tip you'll use for extremely heavy production line soldering. Special iron plating process over Tellurium copper base — coated with pure silver — needs no filing or grinding. ¾" diameter, 1½" long. 47½ watt heating element delivers 1000 degrees tip temperature. 115 V, AC-DC.

## ELECTRIC TOOL CO. OF CANADA

44 DANFORTH ROAD  
TORONTO 13 - CANADA

# I. R. E. SHOW SECTION

## KULKA ELECTRIC MFG. CO. INC. - BOOTH 425

Designers and manufacturers of electrical wiring devices for electronic and electrical equipment for over a quarter century. Makers of molded, barrier-type, terminal blocks in several materials and various styles, ranging in size from sub-miniature to jumbo (90 Amps.); also US Navy and Maritime terminal boards, lamp sockets and other devices; single and double pole, toggle handle switches (aircraft type); miniature power outlets for standard plugs; fluorescent and incandescent lampholders, plugs, sockets, starter switches, cord sets, cable assemblies, and harness units.

President Eugene R. Kulka, EE.  
Secretary-Treasurer William Kulka, CPA.

Factory and main offices: 633-643 So. Fulton Ave., Mt. Vernon, N.Y.

## LAVOIE LABORATORIES INC.

Lavoie Laboratories, Inc. of Morganville, New Jersey, will exhibit several new developments in radar and UHF communications at the I.R.E. Show, Booth Nos. 400, 401 and 500.

The new airborne intercept radar, with stabilized antenna, will be installed in operating condition.

The "BA T" Marine Radar, first shown at last year's show, and now being installed on a number of marine craft, will also be operated, for the benefit of those interested in a compact, inexpensive radar system especially suitable for close-in work.

The Spectrum Analyzer, smallest for its range in the field, will be dynamically demonstrated on a radar pulse, and methods for achieving frequency measurements in the 16,000 megacycle range to .001 per cent accuracy will be shown. By this technique, klystron or magnetron frequency shift may easily be determined.

A new UHF transmitter, with high-performance crystal synthesizer will be operated.

The popular LA-239C Oscilloscope will also be on display.

Personnel will be in attendance to provide information on Lavoie's complete line of test equipment and systems.

Lavoie Laboratories Inc., Morganville, New Jersey.

(Continued on right hand column)

## WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

## VISIT BOOTH No. 359

at the

### 1955 I.R.E. SHOW

TRANSFORMERS for:  
Power, Audio and  
Specialty Requirements

NEW Complete Catalog Now Available... Your quick approach to easy specifying of custom requirements.



### GENERAL TRANSFORMER CO.

18240 Harwood Avenue  
Homewood, Illinois  
(Suburb of Chicago)

Serving Industry Since 1928

## Hudson Tool & Die Co.

472 Electronic Ave.

Standard Cases and Covers.

Quality Metal Stampings.

**I.R.E. Show Exhibit No. 806**  
**features**

1. Edge-lighted Panels.
2. Metal Dials, Panels, Nameplates.
3. Isotope-activated Light Sources.
4. Radioactive Sources including Isotopes, Radium, Ra D, Polonium.
5. Luminescent Materials.
6. T.V. Phosphors.

Plan to stop by — Literature on the above will be available.

**United States Radium Corp.**  
535 Pearl Street, New York 7, N.Y.

Plants and Laboratories at:  
Bloomsburg, Pa.      Bernardsville, N.J.  
Whippany, N.J.      N. Hollywood, Cal.

## D. E. MAKEPEACE COMPANY LEADING PRODUCER OF ELECTRONIC ASSEMBLIES

Major producers of laminated metals, D. E. Makepeace Company of Attleboro, Mass., has become famous as a central source of supply for electronic assemblies of all types.

For example, Makepeace specializes in producing precision-drawn wave guide tubing, held to the closest tolerances to meet the most exacting electrical specifications. Capacity and engineering time are now available both for the manufacture of prototypes and for production runs. Complete testing facilities are available.

As a pioneer in manufacturing precious metal slip rings, Makepeace now offers rings in sizes from .050" O.D. up to 48" O.D. They are available in both solid or laminated precious metals, to meet any requirement for low electrical noise, low torque, in sensitive rotating members to high power application.

Makepeace supplies complete specially engineered and self-contained assemblies to fill the requirements of Radar and other rotating electro mechanical systems. Facilities include design, engineering and testing for noise level, cross talk, and impedance matching for special circuits. Inquiries are invited. Booth 403-405.

**D. E. Makepeace Company,**  
Division of Union Plate and Wire Co., Attleboro, Mass.

## PHILCO INVITES YOU

Visit the Government and Industrial Division exhibit in the forthcoming IRE Show. Here you will see the latest in TV broadcast and communication equipment: 16MM and 35MM Cine-Scanner film telecasting equipments; new television S-T-L, Model TLR-3, which carries color with program audio; new Model CLR-7 microwave communication repeater and terminal. Philco's new "SBT" high frequency transistor and the new X-Band crystal diode, 1N263; complete new line of color TV test equipment will also be exhibited. See us at Electronics Ave. and Broadcast Way, Booths 489, 491, 493.

**Philco Corporation, Government and Industrial Division,**  
Philadelphia 44, Pa.

**SORENSEN****BOOTH 646 — CIRCUITS AVE.**

AC Line Regulators (electronic); AC Magnetic Voltage Regulators; Regulated DC High Current and B-Supplies; Tubeless AC and DC Sources; 0.01 per cent Accuracy Electronic Frequency Changers; High Precision AC Regulators.

Sorensen & Co., Inc., Stamford, Conn.

**LITTELFUSE WELCOMES CANADIAN VISITORS**

Shown below discussing plans for the I.R.E. show, are, left to right: Jack D. Hughes, Vice-President of Littelfuse, Inc., Des Plaines, Illinois, Thomas A. Blake, President, and Herb Cornelius, Sales Manager.

The company will be represented at the show, to be held March 21-24, at the Kingsbridge Armory in New York, by Mr. Cornelius, Walter A. Clements, Sales Engineer, and William Henke, Sales Representative.



All major Littelfuse products will be on display at the company booth, and literature describing many of the products will be available.

Mr. Hughes has issued a personal invitation to Littelfuse friends from Canada who will be attending the show, to visit the booth, meet the company's representatives, review the line, and take home the literature. Booth number 525.

Littelfuse, Inc., 1865 Miner St., Des Plaines, Ill.

**GENERAL RADIO CO. CAMBRIDGE, MASS.**

Since 1915 — Manufacturers of Electronic Apparatus for Science and Industry

Come in and see our display of new and up-to-date instruments, including: motor-driven sweeps for oscillators and slotted lines; signal generator and oscillator for the 900 to 2000-mega-cycle range; audio-frequency bridge that measures any impedance from

(Continued on right hand column)

**WELCOME CANADIANS!**

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

**Hickok Electrical Instrument Co. 458-460 Electronic Ave.**

\*Marker Calibrator Generator, \*Heterodyned Marker Adder, \*Sweep Generator, \*UHF Sweep Alignment Generator, \*Television Video Generator for Color and Black and White, \*Sine Square Wave Generator, \*Noise Generator, \*Electronic VTVM with 9" meter, \*Laboratory Scope, \*Laboratory Dynamic Mutual Conductance Tube Tester, \*Professional Model Color Bar Generator, \*Laboratory Oscilloscope, Field Strength Meter, Volt-Amp-Wattmeters, Ruggedized, and 250 Degree Panel Meters, Switchboard and Portable Meters. \*New Items.

**The Daven Co.****543-545 Components Ave.**

Encapsulated precision wire wound resistors; audio, video, and rf attenuators; solenoid-operated rotary switches; transmission measuring sets for microwave relay systems; vacuum tube voltmeters.

MANUFACTURERS OF

FIELD INTENSITY METERS  
DISTORTION ANALYZERS  
IMPULSE GENERATORS  
COAXIAL ATTENUATORS  
CRYSTAL MIXERS

Visit our Booth 252,  
on Instrument Ave.

**edp** **EMPIRE DEVICES**  
PRODUCTS CORPORATION

38-15 BELL BOULEVARD  
BAYSIDE 61, NEW YORK

**Servo Corp. of America****203-300 Production Rd.**

Radar Recorder, \*VHF Receiver, \*Receiver Converter, \*HV Power Supply, Servoscope\*, Servoboard\*, Signal Generator, Infrared Equipment, Servofrax\* glass, Direction Finders, Pyrometers, Communications test equipment, servo test and analysis equipment.

\*Trade Mark

zero to infinity; a completely new line of potentiometers; universal high-frequency detectors; automatic line-voltage regulator; and a compact, versatile pulse generator.

Sales Representatives in Canada:  
The Canadian Marconi Company,  
Ltd.

**MARCONI EXHIBITS NEW INSTRUMENTS AT I.R.E.**

Amongst several entirely new Marconi instruments being exhibited at the I.R.E. Show in New York are the following:

**SIGNAL GENERATOR TF 801 B**, having a frequency range of 10-500 mc/s with patented contactless waveband selection and output voltage continuously variable from 0.1 microvolts to 2 volts; internal AM and external AM and Pulse Modulation facilities and a "Normal/High" output switch giving the oscillator tube a life considerably in excess of that normally expected in a U.H.F. oscillator. North American type tubes used throughout.

**VTVM TF 1041** has facilities for direct measurement of a-c voltages from 0 to 300 volts with a sensibly flat frequency characteristic from 20 c/s to 700 mc/s; d-c voltages 0-1000 volts, balanced or unbalanced and Resistance from 0.2 ohm to 500 megohms. A large mirror scale meter permits fast and precise reading with a very high order of accuracy. North American type tubes used throughout.

**SIGNAL GENERATOR ASSEMBLY OA 1000** provides a constant frequency output in the 8 to 9 millimetre range and may be unmodulated, sawtooth frequency or squarewave amplitude modulated. The entire equipment consists of a signal generator, three stabilized power units and sweep generator, and automatic frequency control section comprising a Pound stabilizer and associated power unit.

**SPECTRUM ANALYSER OA 1005** for investigation of the spectra of pulses in the 8 to 9 millimetre range.

**FM SIGNAL GENERATOR TF 995A/1** is the latest version of this established instrument and has a frequency range of 2 to 216 mc/s, thus enabling IF circuits to be tested without any separate equipment. In addition to a built-in crystal check circuit simultaneous AM and FM can be produced for the investigation of limiter stages in FM receivers. North American type tubes used throughout.

Ramsey Chaffey and John Robinson of the Canadian Marconi Company will be on the booth to extend a hearty welcome to visitors from Canada. Marconi instrument booths are Nos. 260 and 262 Instruments Avenue.

The Canadian Marconi Co.,  
Montreal.

(Continued next page)

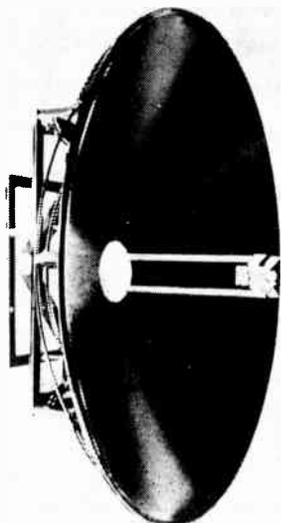
## NEY CONDUCTING ACTUAL PRODUCT TEST OPERATIONS

The J. M. Ney Company, Booth No. 291, will conduct actual test operations of contacts, slip rings, wipers, brushes etc., fabricated from Ney Precious Metal Alloys. These Ney Alloys, with their ideal electrical characteristics . . . backed by many years of experienced design, engineering and application, have been successfully used in precision instruments with the result of improved accuracy and prolonged life.

The J. M. Ney Company, Hartford 1, Connecticut.

## ANDREW ANTENNA CORPORATION LIMITED

ANDREW will exhibit high-gain omnidirectional and unidirectional transmitting antennas, HELIAX air dielectric flexible cable, and other items. One item of much interest will



be the 10 foot parabolic antenna which is illustrated. This antenna is engineered for Canadian conditions, and is now being used in Canada.

Andrew Antenna Corporation Limited.

## NEW TEKTRONIX INSTRUMENTS

Two new additions to the Tektronix Type 530-Series, Oscilloscopes with Plug-in Preamplifiers, make their initial appearance at the 1955 IRE Show. The Type 532 is a d-c to 5 mc oscilloscope with a sweep range of 0.2  $\mu$ sec/cm to 12 sec/cm and 4 kv accelerating potential, conservatively designed for long dependable service. Type 533 is a dc-coupled oscilloscope with a vertical-amplifier risetime of 0.012  $\mu$ sec at a basic sensitivity of 0.1 v/cm, sweep range of 0.02  $\mu$ sec/cm to 12 sec/cm, and 10-kv accelerating potential, designed for extremely wide-

(Continued on right hand column)

## WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

## Brush Electronics Co. 869-875 Audio Ave.

Industrial and research instruments, magnetic components, piezoelectric crystals and ceramics, acoustic products. \*Complete line of rack-mounted oscillographs and amplifiers. Digital counters and sub-assemblies.

## ELCO CORPORATION

2nd & GLENWOOD, PHILA. 40, PA.

America's Quality Line of  
Miniature & Subminiature Sockets,  
Shields and World-Famous  
"Varicon" Connectors

792 AIRBORNE AVE.

## Marconi Instruments Ltd.

260-262 Instruments Ave.

will be showing for the first time Pulse, AM and FM Signal Generators, VTVM, Millimetric and Centimetric instrumentation and a comprehensive selection of communications test equipment.

## S.S.WHITE INDUSTRIAL DIVISION

10 E. 40th ST., N.Y.C., N.Y.

BOOTH 707, AIRBORNE AVE.

- The Industrial "Airbrasive" Unit for fast, precise cutting of hard, brittle materials and for controlled removal of deposited surface coatings. Ideal for printed circuits, film-type resistors, transistors, etc.
- Flexible shafts for power drive and remote control.
- High value molded resistors.

band applications. Both the Type 532 and Type 533 offer the almost unbelievable versatility provided by the Type 53-Series Plug-in Vertical Preamplifiers, including three new Plug-in Units that will be introduced at the 310, has a dc to 4 mc vertical response with a sweep range of 0.1  $\mu$ sec/div to 0.6 sec/div. It is designed for preventive maintenance, calibrating and trouble-shooting complex electronic equipment in the field.

The Type 570 Characteristic-Curve Tracer displays a family of as many as 12 vacuum-tube characteristic curves on a cathode-ray tube. Dynamic characteristics of plate, grid, and screen grid of practically all receiving-type tubes are quickly determined, and direct comparisons are easily made with this new instrument.

The Type 525 Television Waveform Monitor is designed for color telecasters and has controllable vertical-frequency response, keyed d-c restorer, automatically synchronized sweeps, and other features important to the color telecaster.

The Type 181 Time-Mark Generator is a small, lightweight instrument designed primarily for oscilloscope time-base calibrations. It is accurate within 0.03 per cent. For applications requiring greater accuracy, a plug-in accessory crystal mounted in a temperature-stabilized oven offers a frequency stability of 2 ppm over a 24-hour period.

All our Canadian friends are cordially invited to visit the Tektronix exhibit at booths 129 and 131, Kingsbridge Armory, to see and try these new instruments.

Tektronix., P.O. Box No. 831, Portland 7, Oregon.

## METAL TEXTILE CORPORATION

See our demonstration on effective use of METEX Shielding Products for solving difficult RF leakage problems. A *Must* for designers of military and commercial equipment. Our engineers will be present to discuss your problem and provide you with a copy of our NEW "Suppressing Radio Interference with METEX Shielding Products".

Metal Textile Corp., Roselle, New Jersey, Booth 433.

## SPECIALISTS IN PRECISION MASS PRODUCTION OF VARIABLE RESISTORS FOR EVERY ELECTRONIC USE

- Color TV Controls.
- Black and white TV Controls.
- Radio Controls.
- Military Controls.
- Controls for other applications.

See CTS' complete line at Booth 450 I.R.E. Show.

C. C. Meredith & Co., Ltd., Streetsville, Ontario, Phone: 310, Canadian Division: Chicago Telephone Supply Corp., Elkhart, Ind.

## TRAD TELEVISION CORPORATION

TRAD TELEVISION CORP., Asbury Park, N.J., will display their complete line of precision electronic equipment. Featured will be their Model SG-25 Standard-Signal Generator, with a frequency range of 10 kc to 50 mc, accurate within 0.5% (0.05% when using internal crystal calibrator); and Model AT-120 Precision RF Step Attenuator, 0-1000 mc, having an attenuation range down to 120 db total, available in up to 10 steps of 6, 10, or 20 db.

TRAD will also show a new 0-1000 mc Coaxial Switch, with up to 12 positions available, designed for negligible crosstalk and VSWR; and a new 10-1000 mc, three connector, tee-type, Crystal Detector Mount, available in various impedances.

In addition, TRAD will display Standard-Signal Generator Model SG-26, having a frequency range from 4 to 405 mc; and a portable pulse Oscilloscope.

Trad Television Corp., Booth Number is 688.

## BOOTH 702, INSTRUMENT DIVISION, ROLLER-SMITH CORPORATION, BETHLEHEM, PENNSYLVANIA.

Displaying complete line of a-c d-c Ruggedized Instruments, Aircraft Meters, 250° Switchboard Meters, Rotary Switches, Sensitive Relays, Core Magnet Mechanisms, Precision Balances, Elapsed Time Meters and Portable Instruments.

Roller-Smith Products feature advanced engineering and modern styling. Staff on duty will include engineers to answer questions on instrument problems and applications. Research and development facilities available for special applications.

Instrument Division, Roller-Smith Corporation, Bethlehem, Penn.

## BURGESS BATTERY COMPANY, NIAGARA FALLS, ONTARIO

A must for all Canadians to see at this year's I.R.E. Show, is the display of all types of *New Electronic* and Portable Radio Batteries on display at the Burgess Exhibit, Booth No. 762.

The latest up-to-date data on Battery Specifications for new Portable Radio Sets will be available for distribution from our Booth and we especially welcome all Canadians to visit up and obtain the latest Specification Guide and Cross Reference Data Sheet. An executive from the Canadian Sales Division will be in attendance to look after you during the Show.

Burgess Battery Company, Niagara Falls, Ontario.

(Continued on right hand column)

## WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

## ELECTRA

Manufacturing Company  
Kansas City, Missouri  
477 Electronic Ave.

Manufacturers of precision deposited carbon resistors for your most exacting requirements.

## NEW 6- & 8-Channel

### Oscillographic Recording Systems

Plus a complete 4-Channel "150" System designed to record analog computer output, and a single-channel "150" System in two separate portable carrying cases.

Several new interchangeable, plug-in Pre-amplifiers that increase the versatility of any "150" System still further.

All regular "150" systems and equipment for oscillographic recording.

Displayed and demonstrated at Booths 455 and 457, I.R.E. Show, N.Y.C., Mar. 21-24

**SANBORN COMPANY**  
Industrial Division  
Cambridge 39, Mass.

**Heppner Mfg. Co.**  
854 Audio Ave.

\*Lower priced focomag with single ferrite magnet, \*color TV flybacks, Ion traps, Ferrite rod antennas, loudspeakers, Centering devices and correcting magnets.



The Mark of Excellence  
in Electron-Power Tubes

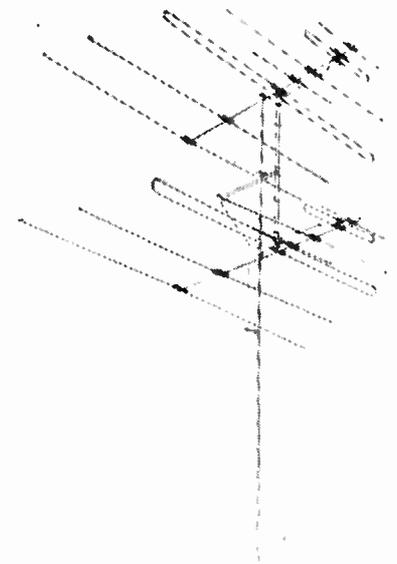
Eitel-McCullough, Inc., world's largest manufacturer of transmitting tubes, will display Eimac tubes featuring new developments in the ceramic tube, klystron and negative grid tube fields. High power, ultra high frequency klystrons and klystron circuit components, as well as famous Eimac triodes, tetrodes, pentodes and rectifiers will be shown.

Members of Eimac engineering and management groups will be present for consultation.

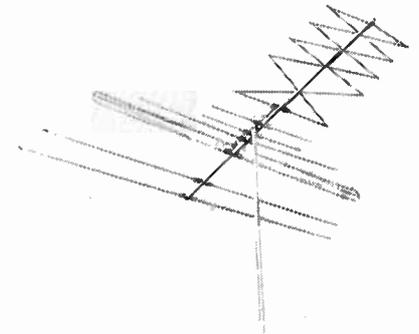
**EITEL-McCULLOUGH, INC.**  
Booths 549-551, Components Ave.

## JFD MANUFACTURING COMPANY, INC.

At the I.R.E. Show, JFD Manufacturing Co. Inc., Brooklyn 4, New York, will exhibit their product in Booth 123, Television Avenue, Kingsbridge Armory. JFD, largest manufacturer



of television antennas and accessories, will show their latest antennas, rotators, and variable trimmer piston capacitors.



Featured at the Show will be models of the new Star-Helix Rainbow and Fireball antennas, the most advanced engineering configurations yet devised for extreme deep fringe reception. Featured, too, will be a complete line of variable trimmer piston capacitors. JFD capacitors offer perfect stability, precision adjustment over the whole range, and other such desirable characteristics.

JFD Manufacturing Co. Inc.,  
Brooklyn 4, New York.

## DON'T MISS SEEING

Don't miss seeing the first  
SILICON JUNCTION RECTIFIERS  
available in production quantities  
at Booths 109-111.

Bogue Electric Mfg. Company,  
Paterson 3, New Jersey.

(Continued next page)

## SLIP RING ASSEMBLIES

When you are at the IRE Show be sure to stop in at Booth No. 602 and see our complete exhibit on slip rings and electro-mechanical assemblies.

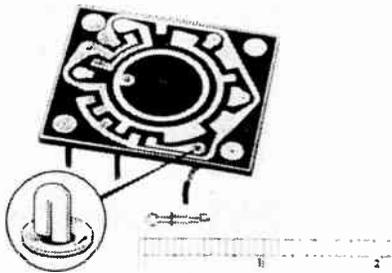
We design, develop and produce slip ring (collector ring) assemblies from one circuit miniatures to 500-circuit, 8-foot installations. Be sure to see our molded miniatures and sub-miniatures.

If you have any problems or questions concerning electro-mechanical assemblies, stop at Booth No. 602 and speak with any of our engineers.

**PM Industries, Inc., 254 Fairfield Avenue, Stamford, Conn.**

## TINY CONNECTOR IS AUTOMATIC LOCKING

HARVEY HUBBELL, INC., Bridgeport, Conn. This subminiature connector has all the features of the Interlock line — automatic locking, quick disconnect action, vibration-proof lock and low contact resistance. Its size (slightly over 1/2 in. in length) makes it ideally adaptable for printed circuit use. Illustration shows its application to a rotary switch plate circuit, manufactured by Photo-circuits, Inc., of Glen



Grove, N.Y. Note how the wired plugs enter through set-in eyelets and lock automatically (inset shows contact magnified.) Plug can easily be disconnected, yet never disconnects accidentally.

**Canadian Representative: Morlen Electric Limited, 552 Rideau St., Ottawa, Canada.**

## FIRST SUCCESSFUL BROADBAND CURTAIN ANTENNAS NOW OPERATING IN CANADA

The difficult problem of incorporating broadband operation in curtain antennas for reliable long distance communications has been mastered here in the installation of two Trylon curtain antennas, each covering a bandwidth  $\pm 15$  per cent of its center frequency. The design and construction were done by Wind Turbine Company, West Chester, Penn., U.S.A., in a subcontract from Canadian Marconi Company Limited. Future Canadian

(Continued on right hand column)

## WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

## General Instrument Corp.

and

### F. W. Sickles Division

Booth at 355 Microwave

\*V/U Combination Tuners. \*VHF Tuners. \*UHF Tuners and Converters and Variable Capacitors. T.V. Deflection Components. I.F. Transformers—R.F. Transformers, all types of Solenoids and Coil products, Toroids, Delay Lines.

## Jennings Radio Mfg. Corp.

436 Electronic Ave.

Vacuum capacitors — fixed and variable types. Vacuum relays — high voltage DC, 60 cycle, and RF units. Vacuum capacitor voltage divider and high voltage voltmeter.

## POTENTIOMETER INSTRUMENTS



**BOURNS LABORATORIES**

RIVERSIDE, CALIFORNIA

Booth No. 788

Airborne Avenue

## CANADIAN REPRESENTATIVE for BOURNS LABS.

Mr. A. G. Shack, Electromechanical Products, Box 105, St. Thomas, Ont.

## Tech Laboratories, Inc.

656 Circuits Ave.

New straight line vertical attenuators and a line of instrument switches which no one can afford to miss.

tower and antenna work will be processed by the recently chartered Wind Turbine Company of Canada, Ltd., 51 McCormack Street, Toronto 9, Ontario.

Using eight bow-tie center-fed dipoles, each antenna requires only 40 high-frequency insulators as compared with several hundred for other curtain antennas; The TRYLON broad-side curtain assures 5 to 10 per cent more reliable distant reception than conventional rhombic antennas of the same size. Low curtain and feed harness impedances allow high power operation.

The Wind Turbine Company of Canada Limited has announced that broadband curtain antennas similar to those described are now available for practically any frequencies and bandwidths. The low standing wave ratio of 1.5 can be further reduced by decreasing the bandwidth below  $\pm 15$  per cent of the mean frequency.

**Wind Turbine Company of Canada Limited, 51 McCormack Street, Toronto 9, Ontario.**

## HIGH TEMPERATURE TERMINALS

Terminals will be shown which are made by a process of brazing alloy steel to high alumina ceramic. Terminals are capable of being brazed into equipment, may be used at high temperatures and pressures and are hermetic. Quality is exceptionally good, one customer reporting no leaks in 9600 units, as each terminal is tested for hermetic seals using high sensitive leak detector. Voltage ranges available up to 60,000 volts or higher, with currents of up to 1000 amps or more.

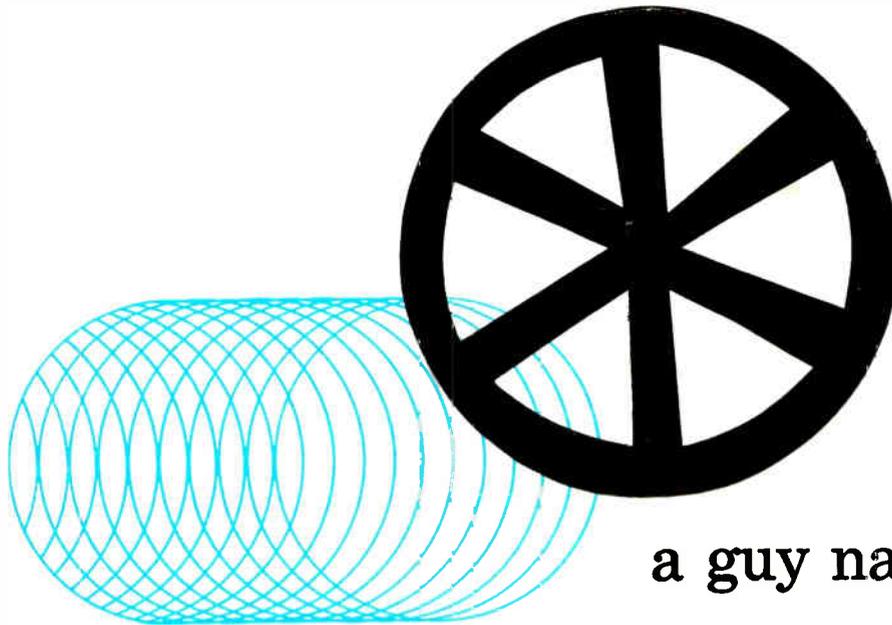
**The Ceramaseal Company, Box 25, New Lebanon Center, N.Y.**

## PSC APPLIED RESEARCH LIMITED

PSC Applied Research Limited (Booth No. 54-56, in Kingsbridge Palace, next door to Armoury) will again be a convenient meeting-message-and-phone center for Canadian visitors to I.R.E. On exhibit will be the Armament Intervalometer used to control rocket-fire pattern on the CF-100, and the PSC Automatic Ice Detection and Shedding Control System for military and commercial aircraft. Both these will be functioning displays, and well worth seeing. Other specialized equipment on view; a Type T232 Mark 6 35-mm instrumentation camera, fully electrical in operation; and another outstanding Applied Research development in the photographic field — the Automatic Tri-Film Processor that develops, fixes, washes and dries and can be quickly adapted to accommodate either 16, 35 or 70 mm. film.

**PSC Applied Research Ltd., 1500 O'Connor Drive, Toronto.**

(Turn to page 48)



## a guy named Og

Once your name was Og. You tired of shouldering  
mastodon steaks...of dragging your mate by her hair.  
You invented the wheel.

Later, your name was Watt. Steam made your kettle-lid  
dance...and the Industrial Revolution was on.

Yesterday, you were a bicycle mechanic named Henry... today,  
your brainchild's descendants are counted in millions.

Your name is legion. You created every linkage...  
every device...every system.

You're an engineer.

You make things work better...faster...more accurately  
...more economically.

Next week...next month...next year... some system will need  
a better, faster, more accurate or more economical  
means of recording...or indicating...or computing...or  
controlling a process.

You'll want precision potentiometers.

You'll discover that Helipot makes the most complete line...  
linear and non-linear versions...in the widest choice  
of sizes, mounting styles and resistances.

*many models of HELIPOT\*  
precision potentiometers are  
stocked for immediate shipment  
...our engineers will gladly  
adapt standard HELIPOTS to your  
requirements...or build  
entirely new HELIPOTS for you.*

*for information and specifications  
...write for data file 204.*

You're an engineer.  
Your career is in  
the making.  
Helipot would like  
to hear from you.

**Helipot** *first in precision potentiometers*

Helipot Corporation/a division of BECKMAN INSTRUMENTS, INC.

Factory: No. 3 Six Points Road, Toronto 18, Ont.

Representative: R-O-R Associates, Ltd., 290 Lawrence Avenue West, Toronto 12, Ont.



390 \*REG. U.S. PAT. OFF.

## HARDWARE FOR ELECTRONIC EQUIPMENT

Quick and sure delivery is assured for thousands of standard or special items used in the electronic industry, such as SCREWS, NUTS, WASHERS, TERMINALS, GROMMETS, RIVETS, EYELETS and ACCESSORIES from Federal Screw Products, Inc. This company also is equipped to supply special cold headed products, Stampings, Screw Machine Parts, made to order in all metals. Write for Catalog 54 to:

**Federal Screw Products, Inc.,**  
3917 N. Kedzie Ave., Chicago 18,  
Illinois.

## NEW DALOHN RESISTORS

Dale Products, Inc., of Columbus, Nebraska, manufacturer of DALOHN Precision Resistors, will show a complete line of deposited carbon resistors and miniature power wire wound resistors in Booths 769 and 771 at the I.R.E. Show.

Several new items will be introduced including a high voltage resistor with resistance values up to 500 Megohms, as well as several styles of ruggedized resistors for use in applications where environmental conditions are such that extreme shock or vibration is encountered.

**Dale Products Inc., Columbus, Nebraska.**

## BURNELL TOROIDAL INDUCTORS AND RELATED EQUIPMENT

Burnell & Co., Inc., is one of the best-known U.S. suppliers of toroids and of filters and other devices utilizing toroids. Their products are used by numerous manufacturers of communications and other electronic equipment. Burnell's display presents both a wide range of standard components and examples of advanced developments.

### Rotoroids

One of Burnell's recent developments is the Rotoroid, a new type of variable inductance toroid (Patent Applied For). The Rotoroid uses a new principle to achieve a nearly linear variation of inductance, while still maintaining the high "Q" of a toroid and without the use of an external power supply. These and other features of the Rotoroid make it useful in numerous applications where a variation of resonant frequency, impedance, or phase angle is required anywhere in the audio range above 300 cps.

### Encapsulated Toroids

Another recent Burnell development is the toroidal inductor encapsulated in Dow Corning "Silastic". "Silastic" is a silicone compound with

*(Continued on right hand column)*

## WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

## VITRAMON CAPACITORS

Miniaturized fused-porcelain components with phenomenal stability, low loss, wide temperature range.

Booth 566—Components Avenue  
**VITRAMON, INCORPORATED**  
Box 544, Bridgeport 1, Conn.

represented in Canada by  
**Aeromotive Engineering Products**  
Montreal, PQ, and Brampton, Ont.

## Continental Carbon, Inc.

### 456 Electronic Ave.

Don't miss seeing our latest line of "Nobleloy" metal film high stability resistors. Deposited carbon film resistors, wire wound resistors. Auto radio and oil burner suppressors.

## CURTIS Terminal Blocks

### Make Better Connections

Economically — Quickly  
**A TYPE FOR EVERY PURPOSE**  
Be Sure to See Them at  
**BOOTH No. 644**

### Curtis Development & Mfg. Company

3266-N. 33rd St., Milwaukee 16, Wis.  
Canadian Representative  
**A. C. Simmonds & Sons Ltd.**  
100 Merton St. - Toronto, Ontario

See **COLLINS**  
Aviation  
Broadcasting  
Communications and  
Amateur  
Equipment



496 - 594, 5, 6, 7 - 694

Broadcast Way  
**IRE Show**

remarkable physical properties; toroids encapsulated in this material are almost entirely protected against damage by chemical action, wetting, mechanical shock, vibration, cutting, etc., over a wide range of temperatures. Both standard Burnell toroids and the inductors of Rotoroids are available encapsulated in "Silastic". Different grades or types of "Silastic" are used to meet the requirements of different applications.

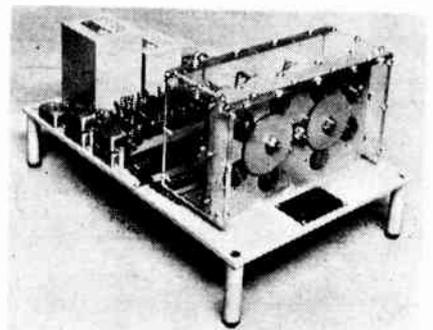
### Other Burnell Products

At the Burnell display, complete information will be available regarding their plug-in decade inductors, side band, band pass, and other communications filters, and their complete line of toroids, including miniature and sub-miniature sizes. Inquiries are invited regarding either the standard components or special ones to meet any particular requirement. Booth No. 678.

**J. R. McUity & Company, 51 Dalewood Road, Toronto 12, Ont.** represents Burnell in Ontario and Quebec.

## MAGNETIC AMPLIFIERS INC.

A new line of miniature Magnetic and Transistor Magnetic Servo Amplifiers will be exhibited operating in servo displays. Tubeless, Magnetic Amplifier Voltage Regulators for rotating machines will be on display. The



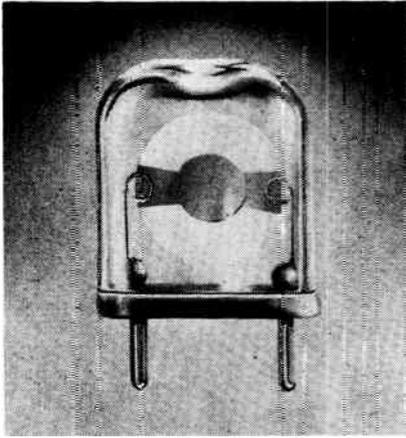
company's Transistor Curve Tracer may be seen too. Technical personnel will be available at our booth number 568.

**Magnetic Amplifiers, Inc., 632 Tinton Avenue, New York 55, N.Y.**

## CRYST-O-GLAS QUARTZ CRYSTAL UNIT

The McCoy Electronics Company has announced production of a Cryst-O-glas quartz crystal unit. This new development, which features an all-glass case and holder, places the crystal in a perfectly hermetically sealed container.

Because heat alone is used in the bonding operation, the crystal itself is never subjected to the chemical fumes given off by conventional sealing compounds. This absence of con-

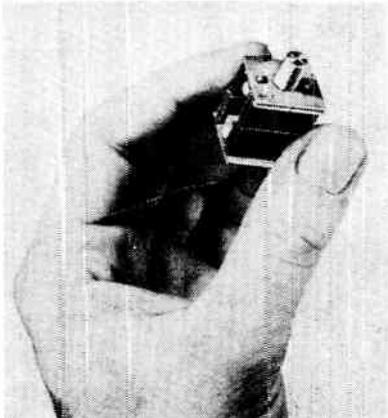


tamination results in greatly increased crystal stability and virtually eliminates the possibility of even slight frequency changes.

For complete information, contact McCoy Electronics Co., Mt. Holly Springs, Pa.

### VARIABLE CAPACITORS FOR SUB-MINIATURE RECEIVERS

The Mini-Dual Variable Capacitor for sub-miniature receivers and transmitters has a capacitance range up to 385 mmfd per section, with at least 10:1 ratio from maximum to minimum. Both rotors and both stators in the unit are isolated for greater flexibility of circuitry.



Capacitor dimensions, exclusive of shaft, are only  $\frac{13}{16}$  by  $\frac{11}{16}$  by  $1\frac{1}{16}$  in. Other specifications of the variable capacitor include: shaft diameter,  $\frac{3}{16}$  in. or  $\frac{1}{4}$  in.; standard shaft length,  $\frac{3}{8}$  in. and weight,  $\frac{1}{2}$  ounce.

McCoy Electronics Co., Mt. Holly Springs, Pa.

### MICROTRAN COMPANY

Microtran Company, 84-11 Boulevard, Rockaway Beach, N.Y., will be exhibiting at booth 634, miniature transformers representative of the hundreds of miniature units available as stock cataloged items. New 1955

(Continued on right hand column)

### WELCOME CANADIANS!

A warm welcome awaits you at the I.R.E. Show exhibits listed in this special section.

BOOTH  
520  
Components  
Avenue

sub-  
miniature  
relays

### ELGIN-NEOMATIC, INC.

A Subsidiary of Elgin National Watch Co.  
9010 Bellanca Avenue • Los Angeles 45

Manufacturers of High Precision Sub-Miniature  
Electro-Mechanical Devices

### Coil Winding Equipment Co. 305, 402 Production Rd.

Newest winding developments in: Motor Coils, Delay Lines, Transformers, Resistors; Lattice, Bank patterns. New high production equipment. Special Laboratory Winders. Tensions for wires  $\pm 10$  -  $\pm 56$ . Engineering help on special problems.

### Induction Motors Corp.



WESTBURY  
LONG ISLAND

734 AIRBORNE AVENUE

Servo, Gear, Blower, Actuator and Torque  
Motors: synchronous and non-synchronous  
in ratings from 1/1000 to 1/10 horsepower.

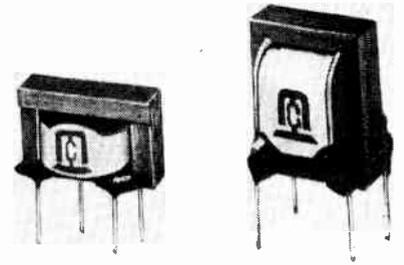
When in  
New York  
visit the

### CANADIAN ROOM

Suites 112 - 114

Hotel Commodore

March 20 - March 24



catalog now available, listing hermetically sealed molded encapsulated encased transformers similar to the type used in guided missiles, airborne equipment, servos, transistor amplifiers and high temperature applications.

Microtran Company Division,  
Crest Laboratories, Inc.

### HELIPOT CORPORATION BOOTH 756 - 758

Bombs Away at Helipot's Display.  
Turn a dial . . . push a button . . .  
sink a ship!

Helipot Corporation's exhibit at the I.R.E. Show will dramatically demonstrate the direct use of HELIPOT\* non-linear potentiometers as computers.

The visitor to Helipot's booth (756-758 Airborne Avenue) positions a miniature destroyer and bomber within broad parameters of range and altitude. HELIPOT precision potentiometers translate range and altitude into voltages  $r$  and  $h$ . Their outputs are amplified and fed to a HELIPOT non-linear unit which solves the equation:  $r = 2 e^2 h \sin 4\theta$  with deadly accuracy.

Then press the firing button . . . a bomb drops, skips, and homes in the ship's smokestack!

Helipot will also display its full line of multi-turn and single-turn precision potentiometers, D U O D I A L\* turns-counting dials, and new HELI-DEL\* delay lines.

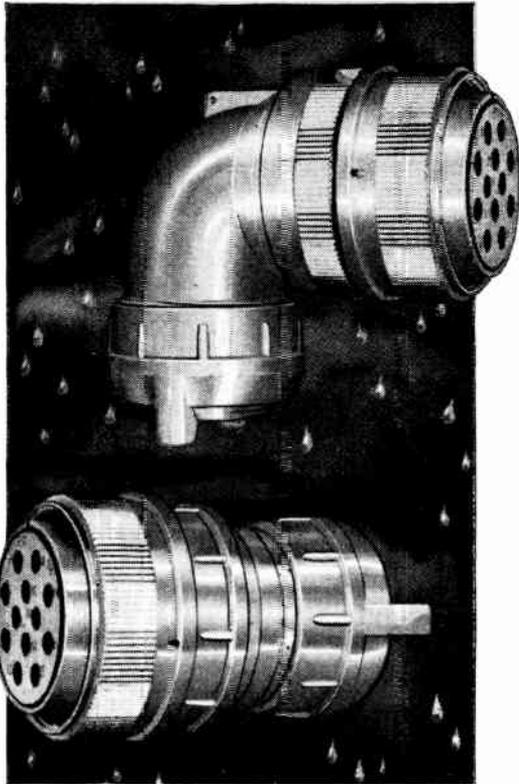
Helipot Corporation, South Pasadena, California.

### ELGIN-NEOMATIC INC. BOOTH 520

ELGIN-NEOMATIC'S most advanced engineering achievements in precision sub-miniature relays will be exhibited in BOOTH 520, Components Avenue, at the 1955 National I.R.E. Show at the Kingsbridge Armory from March 21 thru 24th, it has been announced by Dale Welch, Divisional Sales Manager. Elgin-Neomatic, Inc., 9010 Bellanca Ave., Los Angeles, a division of the Elgin National Watch Company, is one of the nation's leading manufacturers of high precision sub-miniature electro-mechanical devices.

(Turn to page 51)

**NOW!**



**BENDIX-SCINFLEX  
WATERPROOF PLUGS**

*for use with  
multi-conductor cables*

These new Bendix\*-Scinflex *waterproof* plugs are a modification of our standard AN type "E" (environment resistant) connector. They are designed to meet all "E" performance requirements when used with multi-conductor cables. Each plug includes a modified AN3057B cable clamp which provides inward radial compression on multi-conductor cables. This unique feature completely eliminates cable strain—a common source of circuit trouble.

In addition, there are gaskets at all mating surfaces and an accessory sleeve is available to accommodate an extreme range of cable sizes. A folder describing this new waterproof plug—and the various sizes in which it is manufactured—may be obtained by writing our Sales Department. \*TRADE-MARK

**THESE BUILT-IN FEATURES  
ASSURE TOP PROTECTION  
AGAINST CIRCUIT FAILURE:**

- Shock and Vibration Resistant • Die Cast Aluminum Shell • Cadmium Plate—Olive Drab Finish • Moisture-Proof, Pressurized • High Arc Resistance, High Dielectric Strength Silver-Plated Contacts • Resilient Inserts

SCINTILLA  
DIVISION



For Engineering Specifications  
and Application Details  
Consult:

AVIATION ELECTRIC LIMITED  
200 Laurentien Blvd.  
Montreal 9, P. Q.

MANUFACTURERS AND DISTRIBUTORS

1156 YONGE STREET  
TORONTO - CANADA

ELECTRONIC EQUIPMENT COMPANY  
LIMITED

**MR. PROJECT ENGINEER:** *Cleco*

Did you know that the world famous line of K.L.G. Insulators is now stocked in Toronto for immediate delivery?

This Insulator meets all requirements of the combined services. In fact, no glass to metal seals, metalized ceramic or plastic insulator has been able to meet the high standards set by K.L.G. Remember standards stocked for immediate delivery.

P.S.—Write for technical catalogue just off the press.

CONSOLIDATED ELECTRONIC EQUIPMENT  
COMPANY LIMITED

1156 YONGE STREET TORONTO, CANADA

These Are Famous **Super Davohms..**



.. Precision Wire  
Wound Resistors by

**DAVEN**

▶ Electronic  
Specialists for  
More Than a  
Generation

- Accuracies to .05% • All temperature coefficients
- All types of mountings • Manufactured to famous DAVEN standards of precision • Excellent deliveries

Write for Catalog Data

THE **DAVEN** CO.  
193 Central Avenue, Newark 4, N. J.

IN CANADA:  
Adams Engineering Ltd.  
Montreal and Toronto

**New London Instrument  
Company, Inc.**  
New London, Conn.  
166 Television Ave.

Precision Electronic Measuring  
Equipment • FM Signal Genera-  
tor • UHF Noise Source • Atlantic  
Transformer Div. Transformers to  
all commercial and military  
specifications.

**SERVOMECHANISMS, INC.**  
740-742 Airborne Ave.

Servo Amplifiers. Power Supplies.  
Servo Motors. Mechanical Develop-  
ment Apparatus. Pressure Transducers.  
Positioning Mechanisms. Film Potenti-  
ometers. Magnetic Amplifiers.  
Relative Wind Transducers. Accelerom-  
eters. Analog Computers. 60 to 400  
cycle plug-in Components and Systems.

**Industrial Electronics of Canada  
Limited**

83 Torbarrie Rd.  
Toronto, Ontario, Canada

## IRE visitors

*Rogers Majestic  
Electronics Limited*

invite you to visit

### AMPEREX

(Booth No. 273 - 275)

### FERROXCUBE

(Booth No. 340)

### DISPLAY

at the

### IRE CONVENTION

Kingsbridge Armory  
BRONX, NEW YORK  
MARCH 21st - 24th

Ask to see a

**ROGERS**  
representative

### WELCOME CANADIANS!

A warm welcome awaits  
you at the I.R.E. Show ex-  
hibits listed in this special  
section.

(Continued from page 49)

The company has earned world-wide recognition by producing extremely precise sub-miniature (½ cu. in. — ½ oz.) relays with almost unbelievable operational characteristics. Models to be exhibited are performance-proven for extreme sensitivity from .020 watts; high temperature range from —65° to 200° C.; super ruggedness 10 G's — 500 cps; high contact ratings (5 amp., 24 VDC, 115 VAC). All Elgin-Neomatic relays meet Mil R 5757B specifications and are used extensively in the most advanced electronic equipment, computers, aircraft and guided missiles.

**Elgin-Neomatic, Inc., 9010  
Bellanca Ave., Los Angeles.**

### Pointon Represents Radio Receptor

Charles W. Pointon Limited have announced their appointment as exclusive Canadian Sales Representatives for Radio Receptor Company Inc., manufacturers of radio and electronic products since 1922. The Pointon organization located at 6 Alcina Avenue, Toronto 10, will be responsible for the sales of Seletron Selenium Rectifiers for all radio, TV and industrial applications as well as the Radio Receptor line of transistors and diodes.

### Andrew Antenna Appoints R. P. Matthews To Sales And Engineering Staff

The appointment of Richard P. Matthews as Director of Sales and Engineering for the Andrew Antenna Corporation Limited has been announced by the company.

Mr. Andrews is a graduate in engineering physics, a registered professional engineer and a member of the I.R.E., A.I.E.E. and E.I.C.

Mr. Matthews will have his headquarters at the new Andrew Antenna factory in Whitby, Ontario.

### CESCO Appointed Distributor For Potter And Brumfield

Canadian Electrical Distributors have recently been appointed as the Canadian distributor for Potter and Brumfield of Princeton, Indiana.

Potter and Brumfield are well known manufacturers of a wide range of relays used in electronic and industrial applications.

## A NEW TECHNIQUE FOR BETTER VISIBILITY

## by NIGHT by DAY

### ILLUMINATED

- SWITCH ASSEMBLIES
- CONTROL PANELS
- KNOBS
- DIALS

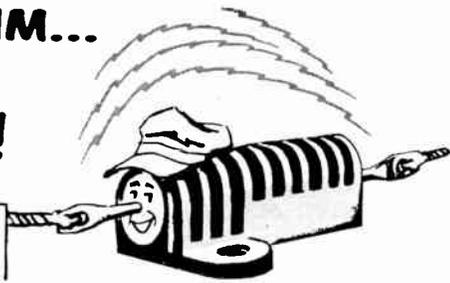
Because of a unique technique, characteristics never before achieved are available in panels, knobs, switches, flat and drum dials. The lettering is *flush*, on a non-reflecting black background, providing maximum angle visibility with no eye fatigue. No after-image remains when these panels and dials are transilluminated in red. An illustrated booklet showing some of the present applications of this new technique (and perhaps provoking some new ideas) is available.

Write for Booklet No. 15

See us at Booth 214  
Instruments Avenue  
I.R.E. Show

**UNIVERSAL AVIATION**  
EQUIPMENT, INC.  
362 Fifth Ave., New York 1, N. Y.  
Wisconsin 7-3574-5

I'm **DALOHM**...  
miniature  
but mighty!



You can depend on



## TYPE RH MINIATURE POWER RESISTORS

For all applications where the equipment must survive the most severe environmental, shock, vibration, humidity and temperature conditions.

Completely welded from terminal to terminal. Silicone sealed in a die-cast black radiator finned housing and mounts on sub-panel for maximum heat dissipation. Impervious to moisture, salt ions, vapor and gases.



Three wattage ranges: RH-25, 25 watts;  
RH-50, 50 watts; RH-250, 250 watts.

- Temperature coefficient 0.00002 / Deg. C
- Ranges from 0.1 ohm to 55,000 ohms depending on type
- Tolerances 0.05%, 0.1%, 0.25%, 0.5%, 1%, 3%, 5%

Conform to Applicable JAN and MIL Specifications

WRITE FOR BULLETIN No. R-21

**DALE PRODUCTS, Inc.**

1322 28th AVE., PHONE 2139  
Columbus, Nebraska, U.S.A.

Export Dept.:  
Pan-Mar Corp.,  
1270 Broadway,  
New York 1, N.Y.

## VOLTAGES UP TO 100 KV IN PULSE, RF, AND 60 CYCLE CIRCUITS MAY BE READ DIRECTLY ON JENNINGS J-1002 VOLTMETER

For the first time, vacuum capacitor voltage dividers have been integrated with a high impedance voltmeter to provide:

- ✓ Six linear voltage ranges including a 50 KV range for single-ended measurements and a 100 KV range for double-ended measurements. (These ratings may be doubled by using a Type JCD vacuum capacitor in series with each divider.)
- ✓ A frequency range of 20 cycles to 20 megacycles at full rated voltage and up to 50 megacycles for lower voltages with low harmonic content.
- ✓ Nearly infinite input resistance with a loading capacitance of less than 4 mmfd.
- ✓ Oscilloscope connections for each divider with voltage division ratios of 300:1.

Use it alone or with either divider connected directly to the vertical deflection plates of an oscilloscope. Use it to measure and view continuous 60 cycle, rf, and pulse voltages. Use it to calibrate oscilloscopes and to measure percentage of modulation, standing wave ratios, phasing, or unbalance. Use it to measure positive peaks, negative peaks, or peak-to-peak values of any symmetrical or non-symmetrical voltage wave.



### SPECIFICATIONS

#### VOLTAGE RANGES (peak volts full scale):

Single Ended: 2.5, 5, 10, 25, 50 KV  
Double Ended: 5, 10, 25, 50, 100 KV

#### FREQUENCY RESPONSE: 20 cps — 50 mc

#### INPUT IMPEDANCE:

Resistance: above  $10^{12}$  ohms  
Capacitance: less than 4 mmfds

#### CALIBRATION ACCURACY: $\pm 3\%$ of f. s.

#### POWER SUPPLY: 117 v., 50/60 c., 20 w.

#### DIMENSIONS: 16" x 10" x 10 3/4"

#### NET WEIGHT: 11 pounds



SOLD DIRECTLY BY JENNINGS

**\$475.50** FOB SAN JOSE  
CALIFORNIA

including two 60 KV voltage dividers.

JENNINGS RADIO MANUFACTURING CORP., 970 McLAUGHLIN AVE. P.O. BOX 1278 - SAN JOSE 8, CALIF.

## NEWS

(Continued from page 41)

### Toronto I.R.E. Members Addressed By F. H. Western

Toronto members of the Institute of Radio Engineers heard Mr. F. H. Western of the Bell Telephone Company of Canada describe "The Automatic Switching of Long Distance Calls" at the Institute's January meeting held in the Bell Telephone Company's new building on University Avenue in Toronto. Elaborate demonstration equipment used by the speaker showed the method of direct dialing of long distance calls and the almost human operation of the intervening equipment which marked the route of the call across the continent. Routes taken by the calls were traced out instantaneously on an illuminated map, showing an alternate route when the most direct one was tied up.

In Canada, direct dialing will be done initially by an operator, but in time, direct dialing by the customer will be introduced.



• A. J. McConvey, P.Eng., is now handling the sales and service of Molded Plastics for the molded plastics section of Canadian General Electric Company. Mr. McConvey's territory is Hamilton and Western Ontario, excluding the Niagara Peninsula. He is located at the offices of Canadian General Electric Company Limited, 355 Main St. East, Hamilton.

### C.G.E. Electronic Equipment Department To Share New Building

Canadian General Electric Company Limited, plans construction of an office and warehouse building on a seven-acre site at Woodward Avenue and Rennie Street in Hamilton's fast-growing east end.

A single-storey brick structure will be erected and is expected to be completed in the early summer of 1955. The new building will house the offices and staff of the company's Wholesale Division, presently located at 100 James Street South in Hamilton, and the Field Service Engineer, Electronic Equipment Department.

## National Vulcanized Fibre Opens New Sales Office

National Vulcanized Fibre Company, one of the oldest and foremost producers of vulcanized fibre and phenolic laminates, which maintains manufacturing plant facilities in Toronto, Canada, will add to its sales office facilities by the opening of a new outlet in Newark, N.J.



**SAMUEL SINCLAIR** The new office, located in the Industrial Office Building, will be headed by Samuel Sinclair, formerly of the New York office.

## Dr. Sinclair Appointed General Radio Vice-President

H. B. Richmond, Chairman of the Board of Directors of the General Radio Company of Cambridge, Massachusetts, has announced that on December 15th Dr. Donald B. Sinclair was appointed Vice-President for Engineering. Dr. Sinclair joined the General Radio Company in 1936, after receiving his Doctor of Science degree from M.I.T. He has served the Company as Engineer, Assistant Chief Engineer, and, since 1949, as Chief Engineer.

Dr. Sinclair is a Fellow of the Institute of Radio Engineers, having been a director of that society for 10 years, treasurer in 1949 and 1950, and president in 1952. He is a Fellow of the American Institute of Electrical Engineers, a member of the American Association for the Advancement of Science, and of Sigma Xi, honorary scientific fraternity.

General Radio Company is represented in Canada by Canadian Marconi Company.

## Alberta Government Telephones Installs Microwave System

A multi-channel microwave system, bridging the 25-mile gap between the Alberta communities of Sundra and Olds, has been purchased by the Alberta Government Telephones from Canadian General Electric Company's Electronic Equipment Department.

The equipment, of a type designed to carry a maximum of 36 voice channels, operates in the 2,000 m.c.'s frequency band. A feature of the equipment is its ability to handle circuits directly from the telephone companies' carrier equipment. To maintain uninterrupted service, the system may be supplied with duplicate facilities with automatic changeover.

(Turn to page 56)

## TEXTILE TESTING

(Continued from page 32)

each other will indicate lateral variations in lap weight.

Both recorder and meters are calibrated to show ounces-per-yard without other computation. The recorder may be remotely located if desired.

### Imperfection Counter

A further electronic aid to the textile industry is the Imperfection Counter also developed by the designer of the Picker Lap Tester. The Imperfection Counter now makes possible the electronic counting of yarn imperfections and was designed in co-operation with the Institute of Textile Technology.

Human errors in counting are thus eliminated, and the task is done more quickly and without fatigue.

An earlier instrument simplified the measurement of yarn evenness, but the counting of yarn imperfections, such as neps, has since remained a tedious, matter-of-judgment operation, with counts varying from person to person and mill to mill.

The new counter, however, provides automatic mechanical accuracy for that job — counting the same number of imperfections that might be counted by eye. It is accurate even at speeds of 100 yards per minute. A permanently positioned yarn handling mechanism accepts any size yarn package and all yarn sizes.

# NOW MORE USES FROM ONE INSTRUMENT 411

## NEW L.f.E. OSCILLOSCOPE • MODEL

### — SPECIFICATIONS —

#### X-AXIS PLUG-IN ADAPTERS

- Model(s) 1400 Basic, with 500 to 5000 cps trigger generator.
- 1401, Sweep Delay, continuously variable from .5  $\mu$  sec. to .1 sec.
- 1402, Sweep Expansion, 5 to 1 expansion.
- 1403, Gated Marker Generator, .1  $\mu$  sec. to .1 sec.
- 1404, TV Trigger Shaper, triggers on composite video signal.
- 1405, Long Sweeps, from .1  $\mu$  sec./cm. to 10 sec./cm.

#### BASIC SCOPE

- Y-Axis Amplifier.
- Deflection Sensitivity — 15 mv./cm. p-p for both d-c and a-c (max).
- Max Signal Voltage — 500 volts, peak.
- Frequency Response — d-c to 10 mc/sec. (3 db point).
- Transient Response — Rise time (10% - 90%) — 0.035  $\mu$  sec.
- Linearity of Deflection — Max. deflection 5". At 2.5" unipolar deflection, maximum compression is 10%.
- Signal Delay — 0.25  $\mu$  sec.
- Input Terminational — 53, 72, or 93 ohms.
- Input Impedance — 1 megohm, 30  $\mu$ f.

#### X-AXIS

- Sweep Time Range, calibrated — .1  $\mu$  sec./cm. to .1 sec./cm.
- External Sweep Sensitivity — 2 volts/cm., p.p.
- Frequency Response — DC to 1 Mc., (3 db. point).
- Triggers — Internal or External to 10 mc., 60 cps.
- DC Blanking.

#### OTHER FEATURES

- Flat-face CRT Type 5-ABPI (P7 or P11 optional) — Accelerating.
- Potential 3000 or 4000 volts.
- Deflection Plates Accessible.
- Power Requirements: 105-125 V., or 210-250 V., 50-60 cycles.
- 385 watts.
- Dimensions: 13" w, 17 $\frac{3}{4}$ " h, 21" d.

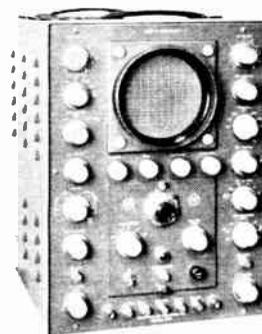
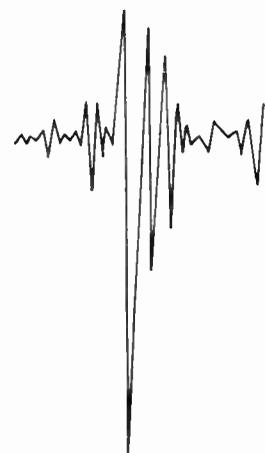


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**COMPUTING DEVICES OF CANADA LIMITED**  
311 RICHMOND ROAD OTTAWA, CANADA

— Leaders in the field of Electronic Computation —



# New Products

New Product specifications published in *Electronics and Communications* have been briefed for your convenience. If you require further information on any of the items published you may readily obtain such by using our Readers' Service, Page 67. Just mark the products you are interested in on the coupon on Page 67 and the information will be in your hands within a few days.

## ● Hi-Fi Console

Item 611

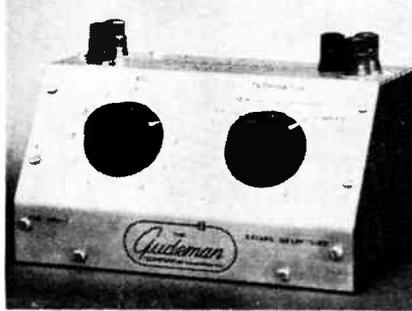
The latest addition to the Hi-Fi line of equipment of a well-known manufacturer has push-pull amplification for reproduction from records played on its 3-speed record-changer. Audio power is conservatively rated at 7.5 watts, and two Alnico 5 speakers are strategically placed for best listening effect. A special efficiency 8-inch speaker is located behind the front grille cloth, and a 12-inch bass reflex speaker faces downward from the base of the elevated cabinet. The frequency response ranges from 50 to 15,000 cycles per second.

The top of the cabinet lifts for access to the record-changer, control panel and record storage space. The 3-speed changer is spring-mounted to eliminate rumble and vibration; has weighted turn-table for constant speed operation; plays ten 12" or twelve 10" records in the standard (78 rpm), long playing (33 $\frac{1}{3}$  rpm), and 45 rpm speeds with an automatic stop after the last record is played. A "Flip-over" needle on a ceramic cartridge is mounted in a resonance-free and counter-balanced tone arm. In addition to the usual "off-on-volume" control, there are separate bass and treble controls for fine adjustment of tonal balance.

## ● Microsecond Decade Delay Line

Item 612

Now in production is a decade delay line, model GDDL-1000-1, with an overall delay of 1 micro-second. Dial-selected taps are at .1 microsecond intervals. Impedance is 1000 ohms, and overall rise time is .1 micro-second.



Delay element is hermetically sealed in Epoxy resin, and the selectors for Delay and Termination are equipped with ceramic wafer switches which have solid silver contacts. Size: 7 $\frac{5}{8}$ " long x 4 $\frac{3}{8}$ " x 4 $\frac{3}{8}$ " exclusive of terminals.

## ● Flat Type Selenium Rectifiers

Item 613

Selenium Flat-Type rectifiers, made by Siemens and Halske, are now available in Canada.

These rectifiers are available in a wide variety of sizes and ranges. For radio, television and other equipment, where currents up to an ampere or more are required, at various voltages, they offer an inexpensive means of obtaining the d-c from the line supply.

As typical of the range, half wave rectifiers operating from 115 volts AC will supply currents up to 180 ma. The 180 ma size unit weighs only 1 $\frac{1}{2}$  oz., is  $\frac{1}{4}$ " thick, 1 $\frac{1}{2}$ " wide and 4" long, over the terminals. Other sizes on application.

These rectifiers require very little space either on or under the chassis plate because the heat is dissipated by direct conduction from the chassis; whether the units are mounted vertically or horizontally, no air ventilation is required.

The chief advantages of the rectifiers are the exceptionally low forward resistance, coupled with high inverse resistance, resulting in the supply of a high DC voltage, with minimal heating and very high life endurance.

## ● Flange-Mounted Permanent-Magnet Motor

Details on the new Type PM-36 Dalmotor Permanent-Magnet Motor are given in a new leaflet — Form PM36-954. This publication includes full dimensional details on this 20-watt, 6,000-r.p.m. unit which is recommended for applications where high efficiency, good speed regulation, and low r-f interference are required. Specification data are tabulated and performance curves given to cover relationships between torque output and input current, rpm, output watts, and per cent efficiency.

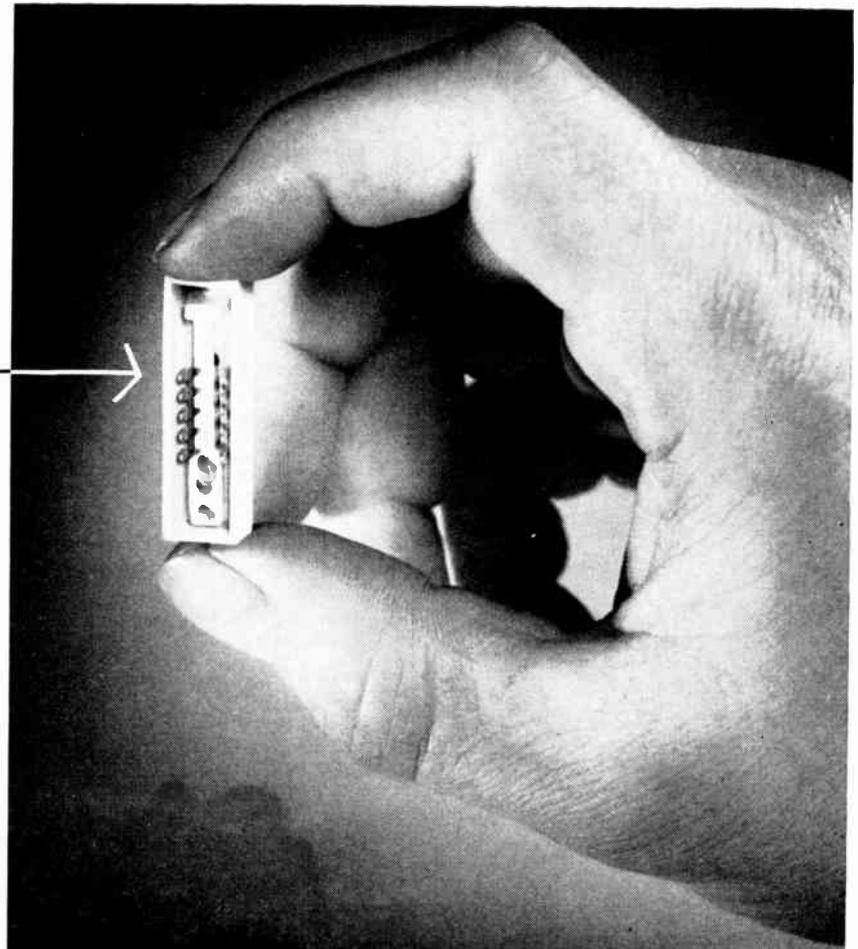
Item 614

here's the secret of  
SUBSTANTIAL  
SAVINGS  
effected with new type 70  
Discharge Blocks

Not only do they give superior protection to communication equipment by grounding themselves to drain lightning and power surges, but they automatically clear themselves after each operation.

This eliminates costly "clearing trips", saves many man-hours and gives longer service life.

For full details, ask for Catalog No. 4068-B



5505

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(CANADA) 1953 LIMITED

Distributor in Canada

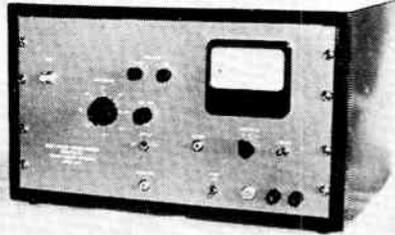
AUTOMATIC ELECTRIC SALES (CANADA) LIMITED  
185 Bartley Drive, Toronto 16, Ont.

For more data on advertised products, use coupon, page 67

● **D-C Milli-Micro-Microammeter** *Item 615*

The Model DC 151 Milli-Micro-Microammeter is an a-c operated instrument for measurement of d-c currents from  $3 \times 10^{-10}$  to  $10^{-7}$  amperes. The low input voltage required (.25 millivolts full scale on all ranges) is particularly useful when measuring currents in circuits having a low driving EMF.

The unit utilizes a direct coupled vacuum tube amplifier with a voltage gain of approximately 400 times, output negative with respect to input. Inverse feedback is so employed that a small current applied to the input produces an equal and opposite current



through the feedback resistor. Voltage output is therefore equal to feedback resistance multiplied by input current. Current gain is substantially independent of the amplifier gain and is therefore independent of the characteristics of the amplifier tubes. Dynamic input resistance rises from 2500 ohm on the  $10^{-7}$  amp range to 25,000 megohm on the  $10^{-11}$  range.

15 Ranges: From  $10^{-11}$  to  $10^{-7}$  amps full scale. Alternative ranges up to  $10^{-1}$  amps may be substituted for any range specified.

Accuracy: Better than 5 per cent from the  $3 \times 10^{-10}$  range through the  $10^{-7}$  range, better than 10 per cent from the  $10^{-11}$  through the  $10^{-10}$  range.

Power Supply: 115 v a-c, 60 cycles approximately 70 watts.

● **Sensitive Relay** *Item 616*

A new development in relays combining high sensitivity with thorough wiping action on each contact has been announced.

The unique features of this relay is highlighted by its low wattage consumption of only 25 Milliwatt per contact together with a genuine wiping action. Heretofore this characteristic has not been available on relays of this type. The bounce and chatter are consequently eliminated by the built-in wiping action in the contact movement.

Designed for D.C. applications, it has the advantage of an extremely long operating life. If desired, Drop-out can be adjusted to about 65 per cent of the Pick-up. Capacity up to 1 amp, inductive and 3 amp resistive load with coil resistance to a maximum of 30,000 Ohms. Available in SPST up to DPDT contacts.

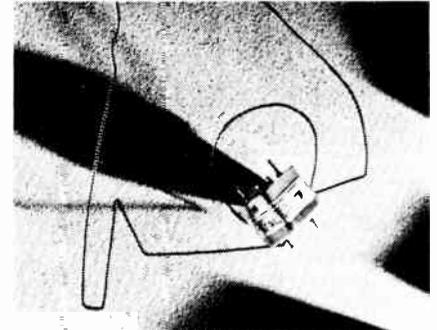
● **New Fast Response Resolver**

A new fast response magnetic resolver, Series 1800, is now offered on the market. An unusually rapid response to step function waves is given by the specially processed high permeability steel core. A typical production test requirement is as follows: when checking null voltage output, the voltage decays to 2 millivolts within 175 microseconds after switchover with a 13 volt 1000 cycle square wave applied to the primary. The unit can be supplied with rotor and stator inductance values held within  $\pm 3$  per cent when desired. Minimum brush noise level makes Series 1800 specially suited for driving circular sweep radar presentations. The resolver is also designed for other applications requiring exceptionally fast recovery time to a step function voltage wave. The vector sum of the output voltages of the quadrature rotor windings is constant in amplitude within  $\pm 5$  per cent and at an electrical angle within 30 minutes of the resolver shaft. Bifilar or quadrature windings are available in the stator. Nominal input voltage is 26 volts 400 cycles with a transformation ratio of  $.29 \pm 5$  per cent. Special design features may be incorporated as required. *Item 617*

● **Miniature I-F Transformers** *Item 618*

Capable of meeting the difficult electrical and environmental requirements of instrumentation, missile, and aircraft applications, a line of new Intermediate-Frequency Transformers is available for 262, 455, and 1525 kc.

The units are capable of withstanding large amplitude vibration and shock because of their construction — powdered carbonyl-iron cup cores are completely embedded in epoxy-resin. Electrically, the double-permeability-tuned units feature unusually constant inductance, free from non-linear effects; and a wide tuning range, as well as high resistance to moisture and chemical attack.



Their operating temperature range is from 50 C to +100 C, with a temperature coefficient of inductance less than 50 ppm/°C.

Housed in 1 1/2-inch cubical cans, the standard units are supplied with zero internal coupling, although specified coupling can be supplied on special order. Voltage rating is 400 volts maximum.

Internal capacitance and Q values are as follows: 262 kc. — 500 uuf, Q greater than 180; 455 kc — 500 uuf, Q greater than 200; 1525 kc — 260 uuf, Q greater than 180.

(Turn to page 60)

# EXPERIENCE and SERVICE



make

## AUTOMATIC ELECTRIC

Your most reliable, most convenient source of supply for telephone wire and cable.

Automatic Electric's coast to coast distribution and engineering sales staff are your guarantee of dependable supply and service. Anywhere in Canada you can be sure of getting prompt delivery on telephone wire and cable that meets your exact requirements.

Automatic Electric know the needs of the communication field through long and intimate association. Take advantage of this experience—call Automatic Electric for your next order.

### PHILLIPS INSIDE TELEPHONE WIRES

The inside telephone wires illustrated here are only two of the complete line of communication wires and cables produced by Phillips. And, as in every Phillips product, you are assured of durability and long life expectancy—even under the toughest conditions.

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ELECTRONICS & COMMUNICATIONS, JANUARY-FEBRUARY, 1955

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# KESTER

Absolutely non-corrosive and non-conductive, KESTER "RESIN-FIVE" CORE SOLDER contains an activated type of resin that gives you that fast, positive action on all your jobs . . . including the most difficult.

**KESTER SOLDER COMPANY OF CANADA, LTD.**  
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# SOLDER

## D. H. Green Named C.N.R. Signals Engineer

The appointment of D. H. Green as signal engineer for the Canadian National Railways at Toronto has been announced by R. O. Stewart, chief engineer. M. Green succeeds E. P. Stephenson, who has been named signal engineer for the system.

## H. J. Clarke Superintendent Canadian National Telegraphs

The appointment of H. J. Clarke to be General Superintendent of Canadian National Telegraphs western region with headquarters at Winnipeg has been announced by J. R. White, General Manager.

In 1934 he joined the Newfoundland Department of Posts and Telegraphs as an inspector in the telegraph division. He enlisted with the Royal Canadian Corps of Signals in 1942 and was demobilized in 1945 with the rank of Captain.

On return to civilian life he became Assistant Secretary in the Department until Confederation in 1949. In April of that year, Canadian National Telegraphs took over the telegraphs division of the Department and Mr. Clarke was named Superintendent for the C.N.T. in Canada's tenth province.

## PROTECTION APPARATUS...

*(Unexcelled on this Continent)*

Communication protection problems of a particularly difficult nature confronted engineers in planning the communication system of the Labrador Iron Ore development. The problems, considered unsurmountable in the early stages of planning, were accepted as a challenge by Osborne Engineers, specialists in protective apparatus, whose thirty years' experience in this field resulted in the successful planning and construction of the highly efficient communication system which now serves the development.

Osborne engineers, manufacture and supply:

- Drainage Transformers
- Isolating Transformers
- Custom Built Transformers
- Grounding Relays
- Horn-Gap Arresters
- Gas-Filled Arresters
- Neutralizing Transformers
- Telephone Ringing Generators
- Custom Wound Magnet Coils

Write for complete data on above.

## OSBORNE ELECTRIC COMPANY LTD.

95 WESLEY STREET

TORONTO 14, ONT.

## H. A. Frankel Elected General Manager Of National Fibre

Harry A. Frankel, Toronto, has been elected Vice-President and General Manager of National Fibre Company of Canada Limited.



H. A. FRANKEL

Mr. Frankel started with National in 1923 and previous to his appointment was Office, Production and Sales Manager.

A member of the Canadian Electrical Manufacturers Association, Mr. Frankel is also a member of the Canadian Manufacturers Association, Canadian Club, Board of Trade, Radio-Television Mfgs., Association of which he was Past-President of the Parts Division and at present is Chairman of the Membership Committee.

## Electro Sonic Appointment

Electro Sonic Supply Co. Ltd., Toronto, have announced the appointment of Ray Putt to the position of advertising manager. Mr. Putt has been with the company since 1950, and was responsible for the production of the general parts catalog recently announced by Essco. He will handle all the firm's advertising.

## Minnesota Mining Commence \$750,000 Expansion Program

Minnesota Mining and Manufacturing of Canada, Ltd., London, Ont., has started a \$750,000 expansion program which will include the construction of two buildings and the transfer of the Irvington division (formerly Irvington Varnish and Insulator Co.) from Hamilton to London.

The new buildings will add 47,400 sq. ft. of floor space to the present plant and be equipped with the latest machinery and methods for manufacturing varnishes, vanished cambrics, extruded plastics, plastic garden hose, bottle cap laminates and special abrasive and adhesive products for the automotive and aircraft industries.

The new buildings, with extended railroad facilities and roadways on the company's 100-acre property will be completed by August 1. The move of machinery, equipment and men from Hamilton will be accomplished during the vacation shutdown of the London plant to minimize interruptions in manufacturing and to avoid lost time for employees.

## Canadian I.R.E. Membership Admissions And Transfers

Transfers and admissions of Canadian member of the Institute of Radio Engineers recently announced

include the following.

Admitted in the grade of Member: F. J. Floyd, 887 53rd Avenue, Lachine, Quebec, and A. A. Wicks, 474 Inkster Blvd., Winnipeg, Manitoba.

Elected as Associate Members: D. T. Black, 4030 West 10th Avenue, Vancouver, B.C.; J. H. Craven, 8190 Glasgow Crescent, Ottawa, Ontario; A. C. G. Jarvis, 8 Broadleaf Road, Don Mills P.O., Toronto, Ontario; J. P. Kahn, 5735 Cote des Nieges, Montreal, Quebec; G. C. McCormick, National Research Council, Ottawa, Ontario; R. G. McIntyre, 147 Galt Avenue, Toronto, Ontario; S. N. Muller, 16 Portage Avenue, Weston, Ontario; and J. W. Rawley, 295 Bayview Avenue, Toronto, Ontario.

## Essco To Enlarge Their Toronto Premises

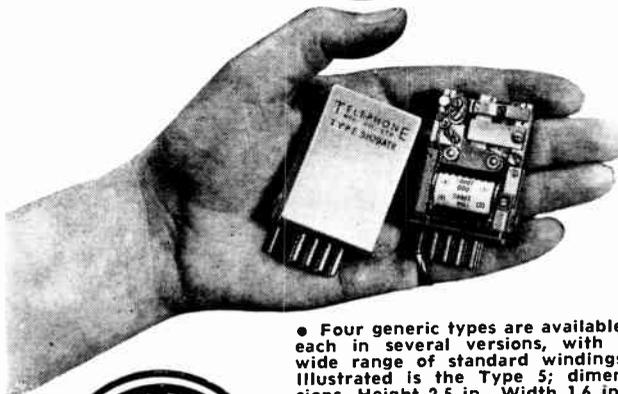
Electro Sonic Supply Company have announced plans to enlarge their Toronto premises by the addition of a new wing which will provide 15,000 square feet of floor space to the existing building. The new wing will be four stories high and construction is expected to commence in March.

The additional accommodation that the new wing will afford will be used for office space, a new show room and a modern sound room.

(Turn to page 58)



## TMC with <sup>^</sup> CARPENTER POLARIZED RELAYS



• Four generic types are available, each in several versions, with a wide range of standard windings. Illustrated is the Type 5; dimensions, Height 2.5 in., Width 1.6 in., Depth 0.8 in., Approx. Weight 4.8 oz.

• They are used in submerged telephone cable repeaters — in stratosphere aircraft — in many varieties of telecommunication and scientific equipment — in metallurgical heat treatment recorders — in biological research — even in swimming bath temperature controllers. *It can help you to perfect your project.*

• With its high sensitivity, the Carpenter Polarized Relay can replace complex amplifying equipment — its almost perfect contact performance enables it to convert minute d.c. signals into a.c. and so simplify electronic amplification — it will operate direct from valves — it will repeat signal impulses with great accuracy as is required in telegraphy, tele-metering, protection and tele-control schemes.

For Technical data and price contact



**TELEPHONE MANUFACTURING CO. LTD.**  
SHOWROOMS & OFFICES: SAXONY BLDG., 26 DUNCAN STREET, TORONTO  
TELEPHONE EM. 6-5314



• The Electronics group of the Canadian and United States government officials attending the Dominion Marine Association and Lake Carriers Association meeting at the Seignior Club shown in a group. *Left to right, front row:* H. C. Risteen and O. L. Britney of the Department of Transport; R. Koteen and W. A. Krebs of the Federal Communication Commission. *Back row:* R. J. Cassidy, Canadian Overseas Telecommunications Corporation; E. G. Henry, Federal Communication Commission; and P. S. Bogard, Transportation and Communication Attache, U.S. Embassy.

Canadian operations only six months ago, is gearing itself for even further expansion, and "eventually expects to produce in Canada all General Instrument television and radio components for which there is a sizable Canadian demand," Mr. Blumenkrantz disclosed.

### C.N.R. To Try Out Radio Telephone Communications

Tests with radio telephone communication in freight train operations, the first of their kind ever undertaken on the North American Continent, are underway on the Canadian National Railways between Montreal and Vancouver, S.F. Dingle, Vice-President of operation for the system has announced.

The experiment is being carried out with the co-operation of Rogers Majestic Electronics and permits instant communication between front and rear end train crews, the trainmen and wayside stations, and, with walkie-talkie equipment, between flagmen and other members of the train crews.

### C.B.C. Engineers Elected Fellows Of The I.R.E.

Three Canadians have recently been elected as Fellows of the Institute of Radio Engineers. They are W. A. Nichols, William G. Richardson and B. G. Ballard.

Mr. Richardson, who is director of engineering for the Canadian Broadcasting Corporation, has been awarded the honor in recognition of his work in the radio and television broadcasting fields. Mr. Nichols, assistant chief engineer of the Canadian Broadcasting Corporation, has been awarded the distinction for his work in connection with the construction of Canada's radio system.

B. G. Ballard is Director of the Division of Radio and Electrical Engineering of the National Research Council, Ottawa.

### General Instrument Expands Canadian Operations

General Instrument Corporation, a leading U.S. manufacturer of television, radio and electronic components, is now completing a five-point program of expansion for its Canadian operation, currently based at Kitchener, Ontario, Board Chairman Abraham Blumenkrantz has announced. Keyed to the needs of the Dominion's own rapidly growing television industry, the program includes: (1) construction of an expandable, 250-employee plant at Waterloo, Ontario; (2) increased development and production of "made in Canada" parts; (3) establishment of a complete product research laboratory; (4) additional personnel; (5) new equipment and machinery.

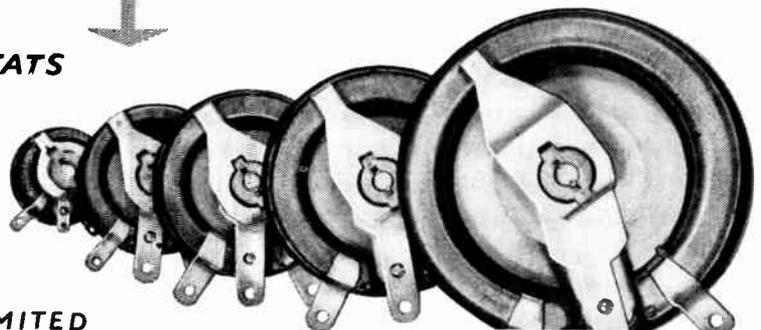
The company, which started its

**There are five sizes... 5 and five important features of...**

- \* VITREOUS ENAMEL BONDED
- \* HIGHEST MECHANICAL STRENGTH
- \* MAXIMUM ELECTRICAL PERFORMANCE
- \* MINIMUM SIZE IN RELATION TO POWER DISSIPATION
- \* CAN BE USED IN TROPICAL SITUATIONS WITHOUT MODIFICATION

Ohms ± 10%	CURRENT RATINGS				
	L.25	L.50	L.75	L.100	L.150
1	—	7.07	8.66	10.00	12.50
2	3.54	5.00	6.12	7.07	8.66
3	2.89	4.08	5.00	5.75	7.07
5	2.24	3.16	3.88	4.77	5.48
7.5	1.82	2.58	3.16	3.65	4.47
10	1.58	2.24	2.74	3.16	3.88
15	1.29	1.83	2.24	2.58	3.16
25	1.00	1.41	1.73	2.00	2.45
50	.707	1.00	1.23	1.41	1.73
75	.578	.818	1.00	1.15	1.41
100	.500	.707	.866	1.00	1.23
150	.408	.575	.707	.818	1.00
200	.354	.500	.612	.707	.866
350	.268	.378	.463	.535	.655
500	.224	.316	.388	.447	.548
1,000	.158	.224	.274	.316	.388
1,500	.129	.183	.224	.258	.316
2,500	.100	.141	.173	.200	.245
5,000	.071	.100	.123	.141	.173
7,500	—	.081	.100	.115	.141
10,000	—	—	—	.100	.125

**...BERCO TOROIDAL RHEOSTATS**



**CANADIAN ELECTRIC RESISTORS LIMITED**

Curry Avenue • Toronto 16 • Ontario • Telephone: Plymouth 5-1891

Manufacturers and Sole Licensees for Berco Products in Canada

BRC1221-AH

For more data on advertised products, use coupon, page 67



# INDUSTRIAL TELEVISION

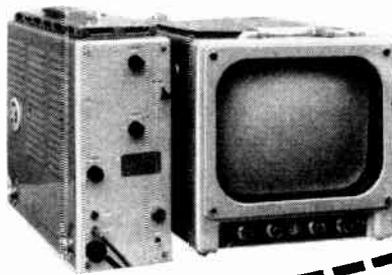
## PYE INDUSTRIAL TELEVISION CAMERA

Only 5" x 5" x 10" and weighing 8½ lbs., the camera is available with flameproof and weatherproof housings.



## PYE CONTROL UNIT AND MONITOR

Control Unit provides remote optical and electronic control of camera up to 300 ft.  
Monitor: a number of monitors may be viewed up to 1000 ft. distant.



Wherever "point to point" transmission of visual information is valuable, industrial television works wonders. Many industries, research laboratories, schools, hospitals are already using it to increase efficiency and cut costs.

For a television camera lens can operate where the human eye cannot penetrate — as for instance in the "working heart" of process machinery.

The cost of the equipment is lower than you imagine — saves itself easily in operation. We invite enquiries.



60 Front Street West, Toronto

SERVICE FROM COAST TO COAST

193 E. Hastings St.  
Vancouver

1191 University St.  
Montreal

P.O. Box 321, St. John's, Nfld.

# MINIATURIZING YOUR EQUIPMENT?

Specify SIMPLEST, MOST COMPACT

# AMPERITE THERMOSTATIC DELAY RELAYS

MOST ECONOMICAL, HERMETICALLY SEALED



STANDARD



MINIATURE

Provide delays ranging from 2 to 120 seconds.

- Actuated by a heater, they operate on A.C., D.C., or Pulsating Current.
- Hermetically sealed. Not affected by altitude, moisture, or other climate changes.
- Circuits: SPST only — normally open or normally closed.

Amperite Thermostatic Delay Relays are compensated for ambient temperature changes from -55° to +70° C. Heaters consume approximately 2 W. and may be operated continuously. The units are most compact, rugged, explosion-proof, long-lived, and very inexpensive!

TYPES: Standard Radio Octal, and 9-Pin Miniature.

PROBLEM? Send for Bulletin No. TR-81

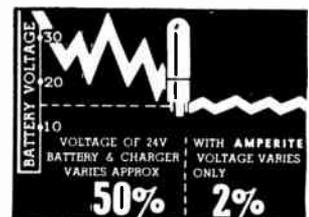
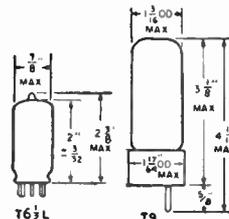
# BALLAST-REGULATORS

- Amperite Regulators are designed to keep the current in a circuit automatically regulated at a definite value (for example, 0.5 amp).
- For currents of 60 ma. to 5 amps. Operates on A.C., D.C., or Pulsating Current.
- Hermetically sealed, light, compact, and most inexpensive.

Maximum Wattage Dissipation:  
T6½L—5W. T9—10W.



T9 BULB

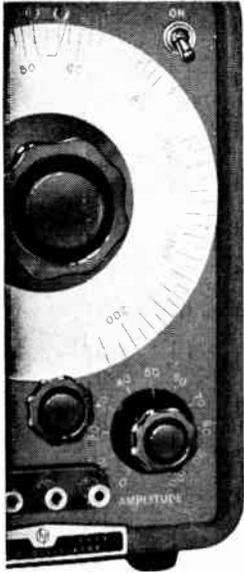


Amperite Regulators are the simplest, most effective method for obtaining automatic regulation of current or voltage. Hermetically sealed, they are not affected by changes in altitude, ambient temperature (-55° to +90° C), or humidity. Rugged; no moving parts; changed as easily as a radio tube.

Write for 4-page Technical Bulletin No. AB-51



AMPERITE CO. Inc., 561 Broadway, New York 12, N. Y.  
In Canada: Atlas Radio Corp., Ltd., 560 King St., W., Toronto 2B



# TEST VOLTAGE PROBLEMS

## 1/100 cps to 10 mc?

Hewlett-Packard has 17 different oscillator models. Some are highly specialized, others are all-purpose instruments. Almost certainly, there's a model to meet your exact requirements. All are precision instruments of highest quality. All embody the famous RC circuit pioneered by *-hp-*. Check the table below for the oscillator that can help you most. Then write us for complete operating and application details.

Instrument	Primary Uses	Frequency range	Output	Price
-hp- 200AB	Audio tests	20 cps to 40 kc	1 watt / 24.5v	\$120.00
-hp- 200CD	Audio and ultrasonic tests	5 cps to 600 kc	160 mw / 20v open circuit	150.00
-hp- 200H	Carrier current, telephone tests	60 cps to 600 kc	10 mw / 1v	350.00
-hp- 200I	Interpolation, frequency measurements	6 cps to 6 kc	100 mw / 10v	225.00
-hp- 201B	High quality audio tests	20 cps to 20 kc	3w / 42.5v	250.00
-hp- 202A	Low frequency measurements	.01 cps to 1 kc	20 mw / 10v	450.00
-hp- 202B	Low frequency measurements	1/2 cps to 50 kc	100 mw / 10v	350.00
-hp- 202D	Low frequency measurements	2 cps to 70 kc	100 mw / 10v	275.00
-hp- 204A	Portable, battery operated	2 cps to 20 kc	2.5 mw / 5v	175.00
-hp- 205A	High power audio tests	20 cps to 20 kc	5 watts	390.00
-hp- 205AG	High power tests, gain measurements	20 cps to 20 kc	5 watts	425.00
-hp- 205AH	High power supersonic tests	1 kc to 100 kc	5 watts	550.00
-hp- 206A	High quality, high accuracy audio tests	20 cps to 20 kc	+ 15 dbm	550.00
-hp- 230A	Carrier test oscillator	35 cps to 35 kc	+ 14 dbm / 600 ohms	275.00
-hp- 233A	Carrier test oscillator	50 cps to 500 kc	3w / 600 ohms	475.00
-hp- 234A	Carrier test oscillator	160 cps to 160 kc	+ 14 dbm / 600 ohms	300.00
-hp- 650A	Wide range video tests	10 cps to 10 mc	15 mw / 3v	475.00

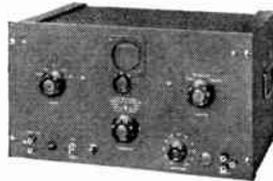
### 2 OF 17 DIFFERENT *-hp-* OSCILLATORS



**-hp- 200CD Audio Oscillator**

World standard for electronic or electrical measurements, now redesigned with wider range, lighter weight, smaller size. Use for any lab, field or production problem in sub-audio, audio, telephony, carrier, supersonic, telemetering or rf measurement fields. Highest stability, low distortion, constant output, no zero set while operating. With carrying strap, or for rack mounting.

*Data subject to change without notice. Prices f.o.b. factory.*



**-hp- 202A Low Frequency Function Generator**

Compact, convenient, all-purpose source of transient-free voltages between 1/100 cps and 1 kc. Provides distortion-free signals for vibration studies, servo applications, medical and geophysical work and other subsonic problems. Generates sine, square or triangular waves. Output 30 volts balanced or single ended, 1% distortion, constant within 0.2 db.

**WRITE TODAY FOR COMPLETE INFORMATION**

**HEWLETT-PACKARD COMPANY**

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SALES REPRESENTATIVES IN PRINCIPAL CITIES



**INSTRUMENTS FOR COMPLETE COVERAGE**

### NEW PRODUCTS

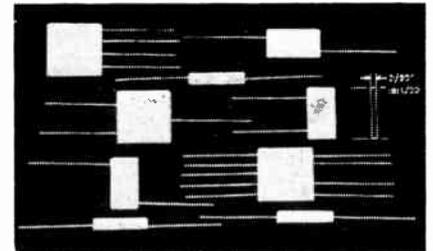
(Continued from page 62)

#### ● *Modular Constructed Bobbinless Precision Wire Resistors*

Item 619

Changes in basic design or construction of precision wire resistors have been few in number in recent years. A short time ago a new company in the field announced a bobbinless noninductive precision wire resistor. Now this company has perfected an even more revolutionary type of resistor — a FLAT rectangular bobbinless unit.

Three outstanding features of this new resistor are as follows: there is no waste area as in a round object. This construction also permits more rapid heat dissipation because the resistor may be laid flat on a metal chassis. A third advantage is that components may be stacked or built over the resistor to form a modular construction.



Other features are: glass-filled polyester housing which is practically indestructible; ability to withstand vigorous vibration and exceptionally high number of gravities; excellent temperature and humidity characteristics; obtainable in resistance ranges from 1/10 ohm to 2 1/2 megohm; tolerance to 0.05 per cent; lower cost due to unique manufacturing techniques and patented designs.

A completely new winding method minimizes strains and permits close tolerance production control — the bobbin is eliminated and a combination of absolute minimum inductance and capacitance effects attained.

#### ● *Production Technique For Etched Circuits*

Item 620

Techniques for the production of etched circuits and name plates are described in a new leaflet now available.

Kodak Photo Resist is a new high-speed light-sensitive plastic coating originally designed for making photoengraving and for making plates for photolithography. It features high stability and uniformity which guarantee the same exposure under any temperature or humidity conditions. This stability permits metal to be pre-coated and stored for future exposure as desired.

It may be used, the company stated, to obtain selective deposition of metals by chemical or electrolytic methods, or pigmented for use as a ceramic decorating material if desired.

Step-by-step methods applicable to the manufacture of both etched circuits and name plates are described.

#### ● *Stock Catalog No. 29*

Item 621

A completely revised 48-page catalog containing photographs and technical data is now available from Centralab. This new Catalog No. 29 is printed in two colors and has a thumb index for easy reference to Centralab's five complete lines of stock components. Some of the latest Centralab developments contained in this 1955 catalog are new Snap-Tite Controls, Senior Compentrol, complete line of 1000 volt rated Disc Capacitors, new Switch, Capacitor and P.E.C. kits, negative 330 and 1500 TC Tubular Capacitors.

Free copies of catalog No. 29 may be obtained on request.

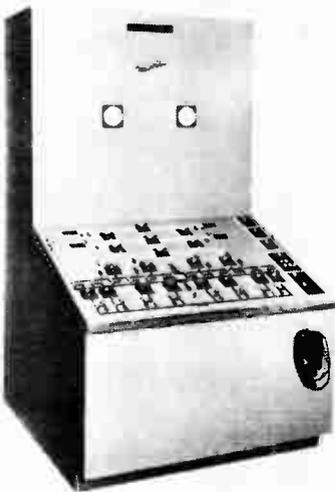
For more data on advertised products, use coupon, page 67

● **Flexible Microwave  
Absorbing Material**  
Item 622

The development and production of a new type microwave absorbing material (recently de-classified by the government) which is especially suited to aircraft and antenna applications has been announced. Designated as the Type T, it is an improved version of the company's F-89VF material and gives excellent performance over a wide range of incidence angles. Due to its light weight and flexibility this material's major application has been in aircraft. It has been used to prevent side lobe reflection, reflection from aircraft fuselage and other antenna obstructions within a radome. The material can be designed for any particular frequency within a range from K band thru L band. It is broad-banded within approximately 7 per cent of the specified frequency and has a power-reflection coefficient of less than 1 per cent (20db) within this band. Typical X-band material, supplied in 18" x 36" sheets weighs 0.25 pounds per square foot and is approximately 0.100" thick. Type T absorbing material is aluminum-backed and is easily mounted with standard adhesives. Due to its unique construction this material can be designed to have the same absorption characteristics at two unrelated frequencies, such as 22,000 mc and 9,500 mc. For special applications, where thickness is an important consideration, Type T absorbing material can be supplied to a particular dimension practically independent of frequency.

● **Supervisory Control**  
Item 623

Complete control of a remote-substation over a power line carrier circuit is possible with this equipment. In addition, telemetering of voltage and current, and voice communication are carried on the same circuit. This particular system features a single-line mimic bus diagram of the station being controlled, with the different voltages in the station represented by colored plastic. The circuit breaker symbols normally used in a diagram are replaced by control escutcheons. One of the most outstanding features of the Nichols system is the speed of operation. In this case, time taken to trip or



close any breaker and receive confirmation of the completed operation is approximately two seconds plus the breaker operating time.

All relays are plug-mounted and are arranged on swinging racks, so that all components are easily reached. The bench-board itself is hinged to permit servicing from behind the panel.

While this equipment was designed specifically to operate on existing facilities, any voice band will accept the control tones, which makes the equipment readily adaptable to radio or microwave links.

(Turn to page 62)

# New TEST INSTRUMENTS for COLOR TV

## TYPE 1105

### VIDEO SWEEP GENERATOR

- High Output
- Flat Frequency Response
- Stable Keyed Carrier Markers
- Low Harmonic Distortion
- 75-ohm Internal Impedance
- Ten Marker Frequencies\*

**\$500.00 FOB Plant**  
(\*Markers \$10 ea. add'l)



### specifications

**RF OUTPUT:**  
2.0 V max. p-p from 75-ohm source into 75-ohm load.

**ATTENUATION:**  
0 to 63 db in 3, 10, 20 and 20 db steps plus 10 db variable.

**SWEEP WIDTH:**  
10 megacycles.

**MARKERS:**  
Keyed pulse-type markers on RF output; 0.01% accuracy; available externally, either polarity adjustable for Z axis modulation.

**SAWTOOTH:**  
Locked to line frequency for horizontal sweep of oscilloscope.

## TYPE 2123

### CHROMATRAN

- High Output (0.2 volts peak-to-peak)
- Low Incremental Amplitude and Differential Phase Distortion
- Sound-Picture Carrier Difference Maintained within 1000 Cycles
- Available for any VHF Channel
- Video Modulating Signal DC-Restored
- Adjustable Sound-to-Picture Carrier Ratio

**\$600.00 FOB Plant**



### specifications

**FREQUENCY:**  
Any single specified VHF Channel.

**PICTURE-CARRIER ACCURACY:** 0.005%.

**SOUND-CARRIER ACCURACY:**  
4.5 mc  $\pm$  1000 cps above picture carrier frequency.

**INTERMODULATION DISTORTION (920 KC BEAT):**  
Better than 50 db below maximum picture carrier level at maximum modulation.

**SOUND CARRIER MODULATION:**  
**INTERNAL:** at least  $\pm$  25 kc deviation, 400 cycles.  
**EXTERNAL:** Deviation sensitivity  $\pm$  25 kc per volt. Maximum deviation  $\pm$  50 kc.

Representative:  
**ATLAS RADIO CORP.**  
560 King St. East West, Toronto, Canada

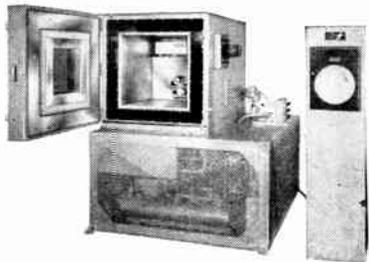
**TIC**

**Tel-Instrument Co. Inc.**

728 GARDEN STREET, CARLSTADT, NEW JERSEY

# AR★

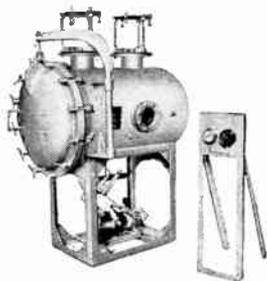
## ENVIRONMENTAL TEST EQUIPMENT



**TEMPERATURE-HUMIDITY** test chamber with automatic control of temperature from  $+500^{\circ}$  F to  $-100^{\circ}$  F and lower.



**ALTITUDE-TEMPERATURE-HUMIDITY** cylindrical test chamber with completely automatic operation and recording;  $+500^{\circ}$  F to  $-100^{\circ}$  F, to 80,000 ft. and higher.



**EXPLOSION** chamber with double safety features for testing under explosive atmosphere conditions up to 50,000 ft.

American Research offers a complete line of Environmental Test Equipment for simulating conditions of high and low temperature, altitude, relative humidity, sand and dust, rain and sunshine, fungus, explosion, gas and air chilling, etc. • Designed and built in a variety of sizes and ranges to meet all government specifications and individual requirements.

Write for catalog

**AMERICAN RESEARCH**  
CORPORATION  
838 BROOK ST. BRISTOL, CONN.

## NEW PRODUCTS

(Continued from page 61)

### ● Inquirers To Get Samples And Catalog Item 624

A newly-developed type of inserts and tapped holes will be presented to potential users for actual tests. Accompanying the stock samples is the new diagrammatic Banc-Lok catalog illustrating the simple application and efficient function of the entire line. No special tools or skill are required, as an ordinary screw driver installs the new inserts quickly, easily and economically. Banc-Loks are the modern method of providing reusable, self-locking threads for blind fastenings in wood, plastics, castings and molded parts, or for material too thin to tap. Banc-Lok inserts are available in aluminum, brass, steel and stainless steel. A broad range of sizes and designs have been engineered to meet your most complex application requirements.

### ● Speaker Microphone Item 625

Small size, quality performance and low cost have been combined in a new dynamic speaker-microphone.

Designated Model No. 100, the unit is housed in a steel and thermoplastic case which can be mounted in the mike housing of dictation machines, portable radio transceivers and other electronic apparatus where a transmitting-receiving unit is desired. An externally-mounted miniature transformer for matching the microphone to grid circuit is available.



Sensitivity of the microphone with transformer is 52 d-b below 1 volt per dyne per square centimeter of sound pressure. As a receiver, the unit will deliver 120 decibels of sound pressure with 10 milliwatts of power input. Nominal impedance is 10 ohms.

Dimensions of the speaker-microphone are  $1'' \times 1'' \times \frac{3}{4}''$ , and weight is approximately  $1\frac{1}{2}$  ounces.

### ● Rubber Sealing Compound For High Vacuum Applications

Item 626

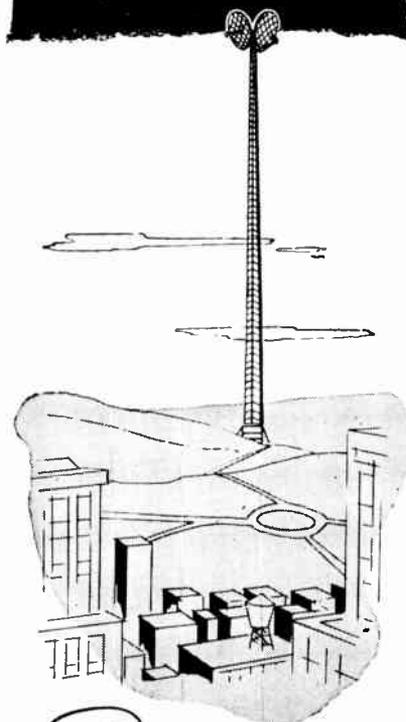
Development of a new rubber compound for sealing such high vacuum applications as electronic devices, lens coating machinery, evaporators, high vacuum distillation, electron microscopes and special testing devices has been announced.

Designated 366YV, the compound is a special formula of Buna N Polymer which can be injection molded into special shapes as well as standard sizes of Quad-rings and O-rings.

Chief advantages of this 366 YV rubber is its high resistance to out-gassing at high temperatures and long service life in permanent installations. Free samples are available to equipment manufacturers and testing laboratories.

(Turn to page 64)

## MICROWAVE ANTENNA SYSTEMS?



# Prodelin

## "Job Packaging"

is the COMPLETE ANSWER

Supply Prodelin with only your specifications, and Prodelin will deliver a complete antenna system — *systemized* to your particular job, with *matched components* and *installation-ready* at your site, when you need it!

### ANTENNA SYSTEMS AND TOWERS

#### ANTENNAS:

- Parabolic (dipole feed) • Off-set Feed (horn feed) • Cavity Fed Corner • Horn • Yagi • Colinear

#### ANTENNA ACCESSORIES:

- Pipe, Tower & Star Mounts • Deicing Kits

#### COAX:

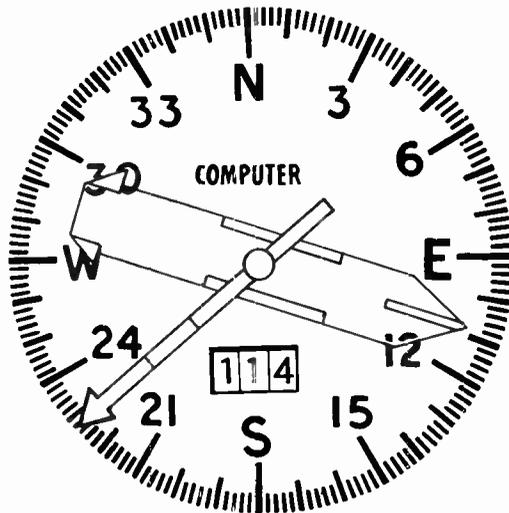
- Line • Couplings • Elbows • Fittings • Adapters • Assemblies • Hangers • Dehydrators

#### TOWERS:

- Semi-Portable All Aluminum.

Visit Us at the I.R.E. Show Booth 395  
WRITE FOR SPECIFIC INFORMATION

**Prodelin Inc**  
307 Bergen Ave. Kearny, N. J.



A new contribution to Canada's defence — the R Theta air navigation system that frees pilots from dependence on radio aid — has revolutionary significance for both military and civil aviation.

Invented by an RCAF project officer, Wing Commander J. G. Wright, R Theta has been developed and produced for the RCAF by a Canadian firm, PSC Applied Research Limited.



PSC Applied Research is proud to have carried out the design and engineering of the R Theta navigation computer.

**PSC APPLIED RESEARCH LIMITED**  
1500 O'CONNOR DRIVE, TORONTO

Development, Engineering and Production in Electronic, Mechanical, Optical, Photographic, Photogrammetric, Survey, Computer, and Automatic Control Systems.

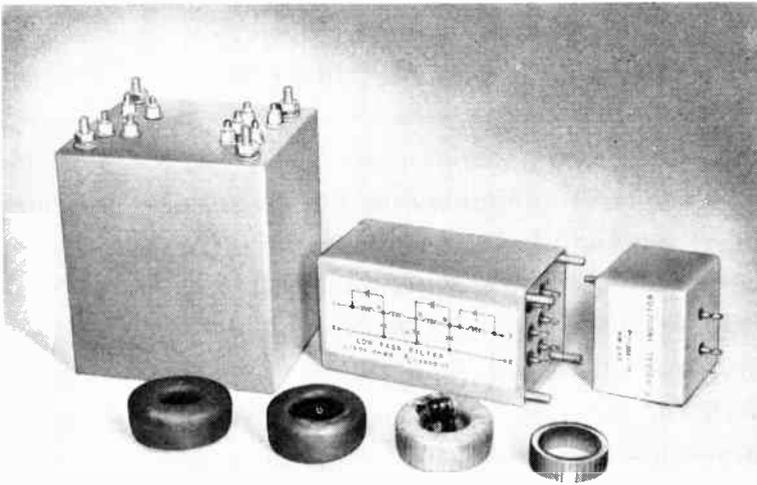
# Magnetic Amplifiers

## Save Money in Control Operations

SUCCESSFULLY USED IN:

SERVO AMPLIFIERS  
REGULATED STATIC POWER SUPPLIES  
CURRENT AND FREQUENCY REGULATORS  
MAGNETIC AMPLIFIER RELAYS  
DEMODULATORS

Let us help you design. Let us manufacture them for you. We have the experience and facilities.



## Filters and Toroids

Used as low pass filters, high pass filters, band pass filters. Individually engineered toroids and chokes to meet your specifications.

SPECIALISTS IN SHEET METAL FABRICATION

ALUMINUM - BRASS - STEEL  
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ARNPRIOR, ONTARIO  
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## NEW PRODUCTS

(Continued from page 62)

### ● Guide To Printed Circuitry Techniques Offered

Item 627

Advantages of printed circuitry for electrical and electronic systems are covered thoroughly in a new 12-page bulletin just published.

Titled "Mechanize Your Wiring . . . With Copper-Clad Phenolite", the bulletin highlights the numerous potentials printed circuitry offers design engineers and manufacturers. Of particular interest is a discussion of the economies of printed circuit design and construction as compared with conventional handwiring methods.

The fully-illustrated bulletin comprehensively covers basic technical facts and design data related to applied printed circuitry. Methods of producing printed circuits and design and construction considerations are treated in detail.

### ● New Type Expanding Cable

Item 628

A new electrical cable that stretches to twice its length is now on the market in Canada. The cable is particularly suited for such applications as telephone headsets, microphones, switchboard leads and similar uses where operators and speakers may require a greater range of movement than is permitted by the ordinary type of cable.

Specifications of the cable are: capacity 1.5 amps continuous or 2 amps for 30 minutes at 60 cycle (may be doubled by using conductors in parallel). Insulation 800 volts a-c or d-c between conductors. Number of conductors from one to six per cable. Terminals, jacks, clips, spade, ring, flag etc. These cables will stretch over twice their contracted length. They may be obtained in any length to suit your particular requirements.

### ● Adjustable Capacitors

Item 629

These capacitors may be adjusted to values from 1 per cent below to 1 per cent above nominal. Once set, the capacitance will remain constant indefinitely. In contrast to other types of adjustable capacitors, F-C-I adjustables employ a self-rigid type of winding which is inherently stable with external pressure. The extra pressure necessary to adjust the capacitor is a small fraction of the total pressure in the assembly, thus assuring an extremely high capacitance stability. The winding is completely non-inductive, thus minimizing power factor and soakage.

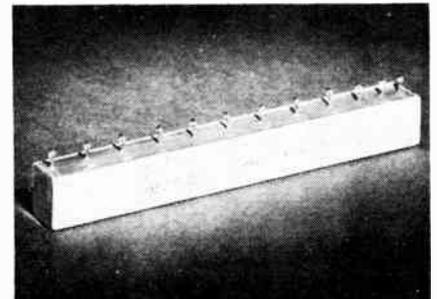
These capacitors find extensive applications in computers, tuned circuits, and timing circuits, where extreme precision is required.

Units are available in all capacity values from .01 Mf to 1.0 Mf. Rated working voltage is 200 DC.

### ● Tapped Delay Line

Item 630

This new .5 microsecond tapped delay line, model GDL 5-1K-T9, which is tapped at .05 microsecond intervals and hermetically sealed

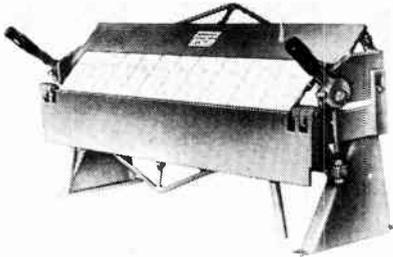


in Epoxy resin has been announced. Impedance: 1000 ohms. Rise time: .05 microsecond. Size: 6 1/4" x 7/8" x 3/4", exclusive of terminals.

## ● Bench Brake For Electronic Laboratories

### Item 631

Experimental, instrument and electronics labs will be interested in a new universal bench brake, ideal for producing custom instrument boxes and radio chassis singly or in short run production. The Model U322 is a quality tool, rugged and easy to operate, yet costs only \$148.50. Design features include replaceable bronze bushings, guaranteeing long, accurate machine life.



Fingers of case hardened steel in widths of 2, 3, and 4 inches allow box depth to 3 inches. Rated capacity of the Model U322 is a  $\frac{3}{8}$  flange on 22 gauge mild steel or heavier equivalent in softer materials on full 3 ft. length.

Literature available on request from the manufacturer.

## ● High Voltage Resistor

### Item 632

A new high voltage (applications up to 20,000 VDC) deposited carbon resistor has been announced.

Designated as Dalohm Type DC-5, the resistor has a power rating of five watts up to 40 degrees C. ambient temperature. Originally designed for use in high voltage string of color TV receivers, the DC-5 resistors has found additional demands in extremely high resistance applications where maximum stability has been prime factor.

Standard resistance values are from 1 Meg to 200 Meg with higher or lower values on request. Standard tolerance is 1 per cent with tolerances up to 10 per cent on request. Temperature coefficient is less than 500 PPM per degree C. average while voltage coefficient is less than 0.002 per cent per volt. The insulation material is a special silicone coating with Kel-F or Vinyl sleeving also available.

## ● Miniature Moving Coil Relay Type 415/416

### Item 633

The Relay consists of a balanced moving-coil in the field of a permanent magnet. The coil has a contact leaf which operates between two adjustable contact springs mounted on the fixed frame. The coil assembly moves to one side or the other and appropriate contact is made according to the direction of the controlling current. The coil has two independent windings which can be wired singly, in series, in parallel or in differential according to the application.

The Miniature moving-coil relay fulfils the need for a magnetically self-shielded unit capable of operating from a power input of 10 microwatts and being of balanced construction functions efficiently in any position. The design is extremely compact, the overall measurements of the Relay being  $1\frac{3}{8}$ " x  $\frac{3}{4}$ " x  $\frac{5}{8}$ ".

The contacts are platinum and may be employed to control a non-inductive load providing that the AC or DC valves do not exceed 50 volts: 100 milliamps: 2 watts.

The Relay is supplied in two models, Type 415 with coils having a resistance of 100 ohms and Type 416 with coils of 350 ohms.

(Turn to page 68)



Get this latest booklet!  
...a new concept of

# Vibration and Shock Control

Special types of Robinson all-metal (Met-L-Flex) mountings described in this booklet incorporate advanced design features which have been developed after extensive research and laboratory work, collaboration with missile designers and service experience.

Exclusive Robinson all-metal designs provide damping four times better than conventional mounts employing rubber, organic or synthetic materials. *This high damping results in utmost stability assuring greater reliability of the mounted equipment.*

Yours for the asking, the new booklet (No. 800) offers the answers to many exacting and unusual problems of mounting electronic equipment in supersonic aircraft and missiles.

The booklet includes engineering data and specific examples of various types of mounts and engineered mounting systems currently being applied and used in important missile projects. Send for your FREE copy today.

## New Standards of Vibration Control

Whether your problem involves precision instruments, electronic equipment, aircraft, motor vehicles, home appliances or industrial machinery, we will tackle it with the same engineering know-how and skill that has marked Robinson as leaders in the field of airborne vibration and shock control. Write or wire, stating your problem, to: 200 Laurentien Blvd., Montreal.

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manufacturing  
a complete line  
of all types of  
capacitors for  
every electrical  
and electronic  
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## NEWS

(Continued from page 58)

### W. M. Chamard Appointed C.A.E. Vice-President

The election of Mr. W. M. Chamard as Vice-President in charge of Finance of Canadian Aviation Electronics Ltd. has been announced by Mr. K. R. Paffrick, President and Managing Director.



Mr. Chamard was formerly Secretary-Treasurer.

A graduate of McGill University (1935), William Morrison Chamard was formerly Comptroller of RCA Victor Co., and has been associated with Campbell, Glendenning and Devers, the Auditor General's Office, National Harbours Board, and was a corporation assessor for the Department of National Revenue.

Mr. Chamard will continue his duties as Secretary-Treasurer of the company and as a member of the Executive Committee.

### Expansion At Rogers Majestic Electronics Limited

Morley C. Patterson, Manager, Tube and Component Division, Rogers Majestic Limited, announces the appointment of R. S. Williams to the newly created post of Marketing Manager, and J. F. Hogan to Distributor Sales Manager, Tube and Component Division.



R. S. WILLIAMS

Mr. Williams was formerly Sales Manager, Electronic Tubes, while Mr. Hogan was Field Sales Supervisor, Replacement Tubes.

The new post of Marketing Manager has been established in line with the rapidly expanding activities of the division and will increase the number and variety of services rendered to its customers.

### Federal Electric Manufacturing Company Announce Change Of Name

Announcement of the change of name of Federal Electric Manufacturing Company Limited to that of Standard Telephones and Cables Manufacturing Company (Canada) Limited has been made by F. Tomlinson, the firm's Executive Vice-President.

Concurrent with the change of name of the company the Board of Directors was also concurrently reconstituted. Canadian officials of the company featuring in the reconstitution of the Board are Mr. J. H. Filip, Comptroller, Montreal; Colonel W. A. Steel, Montreal and Mr. F. Tomlinson, Executive Vice-President, Montreal.

Standard Telephones & Cables Limited have for many years been one of the leading companies in the development and manufacture of all forms of communications and control equipments, and in the planning and installation of such systems throughout the World.

### A. A. Allan Appointed Bakelite Sales Manager

Arthur A. Allan Jr. has been appointed Sales Manager of Bakelite Company, Division of Union Carbide, Canada, Limited. Perry Wilson, President of Bakelite Company, made the announcement recently.

Mr. Allan graduated in 1945 from the University of Toronto Chemical



Engineering. He joined the Bakelite Company in September, 1945, as a member of the Manufacturing Staff, and for three years prior to entering the Sales Division was in charge of the Phenolic Moulding Material Dept.

Mr. Allan is a member of the Society of Plastics Engineers and the Society of the Plastics Industry. He will be located at 1 University Avenue, Toronto, which in the future will be headquarters for all Bakelite sales.

# READERS' SERVICE PAGE

We realize that our readers are busy people and may not always have time to write letters of enquiry to manufacturers regarding advertised products that are of interest to them. Therefore, to save you the time of writing a letter, we offer you the use of this Readers' Service Page. It is designed for your convenience in obtaining free and without obligation detailed information on any advertiser's product or New

Product appearing in this issue of *Electronics and Communications*.

Check as many New Products or Advertisements as you like on the attached coupons and send to *Electronics and Communications*, 31 Willcocks Street, Toronto 5, Ontario. We will see that detailed information concerning your enquiries is in your hands within a few days.

## Check Advertiser's Name For Information

Advertiser	Page	Advertiser	Page
<input type="checkbox"/> Aerovox capacitors	66	<input type="checkbox"/> Electro Sonic miniature capacitors	14
<input type="checkbox"/> American Research environmental test equipment	62	<input type="checkbox"/> Erie Resistors ceramicons	27
<input type="checkbox"/> Amperite thermostatic delay relays	59	<input type="checkbox"/> Federal Wire & Cable magnet wire	17
<input type="checkbox"/> Andrew antenna systems	25	<input type="checkbox"/> Freed megohmmeters	38
<input type="checkbox"/> Arco "Elmenco" tubular capacitor	75	<input type="checkbox"/> Glendon subminiature electrolytics	30
<input type="checkbox"/> Astral "Wearite" tapdeck	70	<input type="checkbox"/> Hammond transformers	14
<input type="checkbox"/> Astral "Drillite" capacitors	36	<input type="checkbox"/> Helipot potentiometer	47
<input type="checkbox"/> Astron capacitors	11	<input type="checkbox"/> Herring miniatures	73
<input type="checkbox"/> Automatic Electric paystations	37	<input type="checkbox"/> Hewlett-Packard oscillators	60
<input type="checkbox"/> Automatic Electric wires and cables	54	<input type="checkbox"/> Hooker electronic components	12
<input type="checkbox"/> Automatic Electric telephone supplies	55	<input type="checkbox"/> Hughes Owens "Wrico" universal scriber	77
<input type="checkbox"/> Aviation Electric two-way radio systems	31	<input type="checkbox"/> Jackson test equipment	78
<input type="checkbox"/> Bach Simpson tube tester	6	<input type="checkbox"/> Jennings voltmeters	52
<input type="checkbox"/> Bakelite molding materials	8	<input type="checkbox"/> Kesler solder	56
<input type="checkbox"/> Bank of Canada industrial finance system	32	<input type="checkbox"/> Lab-O-Ring "Norma" multirange test set	56
<input type="checkbox"/> Bell Telephone communications	74	<input type="checkbox"/> Lenkurt A.C. Power emergency supply equipment	2
<input type="checkbox"/> Bendix aircraft inverters	82	<input type="checkbox"/> Measurement Engineering magnetic amplifiers	64
<input type="checkbox"/> Bendix Scintex waterproof plugs	50	<input type="checkbox"/> Motorola two-way radio	69
<input type="checkbox"/> Berco toroidal rheostats	58	<input type="checkbox"/> National Fibre "Phenolite" laminated plastic	81
<input type="checkbox"/> Hohne springs	14	<input type="checkbox"/> Osborne protection apparatus	56
<input type="checkbox"/> Bomac microwave equipment	14	<input type="checkbox"/> P.S.C. R-Theta air navigation system	63
<input type="checkbox"/> Bristol potentiometers and pyrometers	83	<input type="checkbox"/> Philips telephone wires and cables	76
<input type="checkbox"/> British General Electric GEX 35 CAN.	7	<input type="checkbox"/> Prodelin microwave antenna systems	62
<input type="checkbox"/> Canadian Aviation Electronics electronic equipment	78	<input type="checkbox"/> Pye industrial television	59
<input type="checkbox"/> Canadian General Electric electronic engineers wanted	39	<input type="checkbox"/> Radio Engineering Products frequency shift V-F carrier	28
<input type="checkbox"/> Canadian General Electric semi-conductors	34	<input type="checkbox"/> Radio Engineering Products 12 channel carrier telephone system	28
<input type="checkbox"/> Canadian Marconi Clarostat controls and resistors	33	<input type="checkbox"/> Rogers Majestic "Permakay" filter	68
<input type="checkbox"/> Canadian Marconi tubes	4	<input type="checkbox"/> Snelgrove quartz crystals	28
<input type="checkbox"/> Canadian Marconi instruments	3	<input type="checkbox"/> Stark electronic instruments	78
<input type="checkbox"/> Canadian Stackpole variable resistors	10	<input type="checkbox"/> T.M.C. polarized relays	37
<input type="checkbox"/> Canadian Westinghouse full-wave rectifier	84	<input type="checkbox"/> Tel test instruments	61
<input type="checkbox"/> Canadian Westinghouse tape equipment	79	<input type="checkbox"/> U.S. Engineering etched and printed circuits	16
<input type="checkbox"/> Cannon plugs	23	<input type="checkbox"/> Ungar electrical soldering pencil	40
<input type="checkbox"/> Collins microwave equipment	40	<input type="checkbox"/> Ungar Hi-Heat soldering tips	41
<input type="checkbox"/> Computing Devices oscilloscope	72	<input type="checkbox"/> Universal Aviation illuminated switches	51
<input type="checkbox"/> Consolidated Electronic K.L.G. insulators	53	<input type="checkbox"/> Wholesale Radio & Electronics pocket-size AC-DC ballometer	38
<input type="checkbox"/> Cossor V.H.F. dual transmitter	50	<input type="checkbox"/> Wiley technical books	40
<input type="checkbox"/> Dale miniature power resistors	52	<input type="checkbox"/> X-Ray & Radium Industries cable	16
<input type="checkbox"/> Daven resistors	50		
<input type="checkbox"/> Dawe "Q" meters	12		
<input type="checkbox"/> Eimac tubes	80		

## Check New Product Item For Further Information

<input type="checkbox"/> 611	<input type="checkbox"/> 615	<input type="checkbox"/> 619	<input type="checkbox"/> 623	<input type="checkbox"/> 627	<input type="checkbox"/> 631	<input type="checkbox"/> 635	<input type="checkbox"/> 639
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<input type="checkbox"/> 614	<input type="checkbox"/> 618	<input type="checkbox"/> 622	<input type="checkbox"/> 626	<input type="checkbox"/> 630	<input type="checkbox"/> 634	<input type="checkbox"/> 638	<input type="checkbox"/> 642

Company Name

Your Name

Your Position

Address

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Company Name

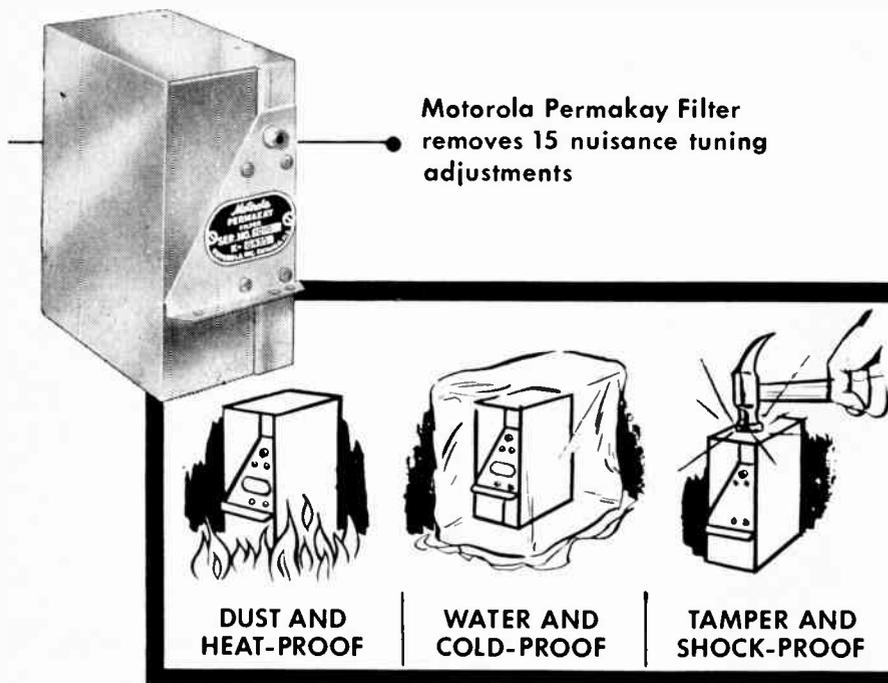
Your Name

Your Position

Address

# Motorola\* Selectivity

**GUARANTEED FOR  
THE LIFE OF THE SET**



Motorola Permakay Filter  
removes 15 nuisance tuning  
adjustments

**DUST AND  
HEAT-PROOF**

**WATER AND  
COLD-PROOF**

**TAMPER AND  
SHOCK-PROOF**

The amazing PERMAKAY filter used in every Motorola 2-way radio receiver results in *maximum selectivity*. The Permakay filter requires no adjustment or maintenance and is *guaranteed for the life of the equipment*. Cast in a solid mass of plastic, the Permakay filter can never be affected by water, dirt, heat, cold or mechanical shock. Temperature compensation ensures constant faultless performance even at extreme temperatures. Year in, year out, Motorola installations number more than *twice* those of all other manufacturers combined. In Canada alone, more than *three out of five* V.H.F. 2-way radio units are Motorola.

Distributed by

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*Equipment Division*

**ROGERS MAJESTIC ELECTRONICS**  
LIMITED

HALIFAX • MONTREAL • TORONTO • WINNIPEG • VANCOUVER

## NEW PRODUCTS

(Continued from page 65)

### ● Scintillation Counter Head Item 634

A compact, light and versatile counter head for use with a wide range of phosphors in work connected with alpha, beta and gamma rays, protons, neutrons and X-rays. It has been designed for exacting research (i.e., gamma-ray spectrometry); to cover measurements when using radioactive isotopes for diagnostic and therapeutic purposes in medicine; and for routine investigations and general monitoring.

The unit is built in two sections. The upper section (the detector unit) contains the voltage divider chain, photomultiplier tube and phosphor, the whole being covered by an interchangeable light-tight cap. The lower section contains the cathode follower unit.

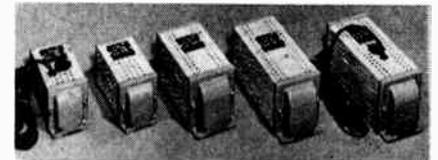
The upper section containing the photomultiplier tube has a spring loaded retaining ring to accommodate phosphors up to 44 millimetres in diameter and 25 millimetres in thickness. The phosphors may be positioned to give optimum optical contact with the photomultiplier tube before the light-tight cap is fitted. Light-tight, easily-interchangeable caps are available to fit the upper section of the detector head, to allow for thin end-window counting, lead collimation shielding and the accommodation of various sized phosphors.

The lower, ventilated section containing the encapsulated cathode follower is accessible by the removal of one screw and the metal cover; while the upper section still remains light-tight.

### ● Magnetic Voltage Regulators Item 635

Now available is the first four models of what will be an extensive line of magnetic voltage regulators, or regulating transformers.

The units have capacities of 15, 30, 60, and 120 VA. Soon to be added will be units of 250, 500, and 1000 VA capacities. They are primarily intended for incorporation into other equipment, where performance becomes more effective when the incoming line voltage is stabilized. However, they can be used as auxiliary line stabilizers.



Electrical Specifications are as follows:

Input voltage range:

95-130 VAC, single phase, 60 cycles.

Output range:

115 VAC, RMS, single phase.

Regulation accuracy:

±0.5 per cent against line changes.

Load conditions:

±0.5 per cent against line at any given load from 0 to full.

Time constant:

From 2 to 6 cycles for line changes.

### ● Alumina Hermetic Terminals Item 636

Using the manufacturer's new developments in metallizing (plus superior glazing for minimum surface losses) these terminals eliminate the problems previously encountered due to the fragility of banded areas.

The manufacturer's process (Nicote metallized coating) involves the reduction of metal oxides in a controlled atmosphere resulting in a fusion of the ceramic body and the base metal banding. The bond thus obtained resists all normal abuse and allows the use of high temperature solders, such as eutectic silver — copper alloy.

The manufacturer's standard alumina body itself is satisfactory for use up to 2000°F. and has the high thermal shock resistance and excellent mechanical strength inherent in high grade alumina.

For more data on advertised products, use coupon, page 67

## ● Survey Depth Recorder

Item 637

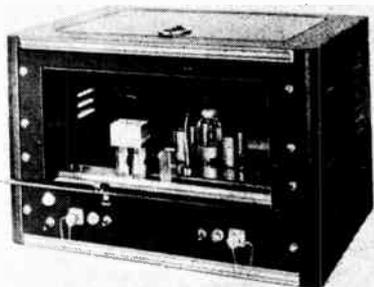
The Survey Depth Recorder, weighing only 75 pounds, is designed for permanent or temporary installation in every type of marine survey craft. Accurate to within one-half of one per cent, the Recorder uses echo sounding principles to measure the depth of water from three feet to 250 fathoms and charts the depth information in legible and permanent form.

Experts in the field of hydrographic survey, including cartographers, oceanographers, and dredgers, collaborated in setting forth the basic requirements for the new Edo Survey Depth Recorder. The device as developed by Edo engineers is the most precise piece of equipment yet devised for measuring the exact depth of water in channels, harbors, inland or coastal waters it is claimed. It operates in vessels traveling at speeds up to 15 knots, in clear or muddy water, whether fresh, brackish or salt.

## ● Isotope Analyzer

Item 638

This instrument is designed to perform rapid and accurate qualitative and quantitative analysis of isotope mixtures containing beta emitting components. The technique is based on the absorption and scattering of beta rays in materials of high atomic numbers as described in Zeitschrift für Physik 138, 441, 1954.



The instrument is several times as sensitive as beta spectrometers. Three different models of the unit are available, with the minimum activity of an isotope necessary for its detection being  $4 \times 10^{-10}$ ,  $1.2 \times 10^{-10}$  curies, and  $0.2 \times 10^{-10}$  curies. The Isotope Analyzer may be operated with any commercial scaling unit having a 0.25 volt input sensitivity and a high voltage supply.

The Isotope Analyzer is particularly useful in medical examinations using multiple tracer techniques, in neutron activation analysis and for the determination of the nature of food contamination.

## ● Midjet Toroid Coil Winder

Item 639

For winding small toroid coils having an inner diameter when finished of  $\frac{1}{8}$  of an inch, the new MidJet Toroid Winder has been especially developed.

The new miniature winder measures only  $9\frac{1}{2}$  inches in length. Wire sizes from No. 30 to No. 44 can be wound on closed magnetic cores of wound tape, stacked ring punchings or molded powder. Winding speeds range from 400 turns per minute to 600 turns per minute regardless of wire size. Turns are laid radially under tension which is adjustable to suit the tensile strength of the wire being used. Highly polished guides prevent abrasion of wire insulation.

Manual rotary core feed allows clockwise or counter-clockwise progress of the winding. Layer winding may be done by continuous core advance in one direction. Bank winding, by reversing the core feed at intervals, may be performed to reduce distributed capacity of the coil. Full 360 degrees of core coverage is made in two winding sectors of 180 degrees each. For continuous 360° wind, manual positioning may be used, or for precise sector winding of 180° or less, a rotary vise is supplied having resilient jaws.

A register type counter records the wire loaded on the shuttle and counts the turns laid upon the core.

(Turn to page 73)



why more than  
three out of five  
Canadian operators  
choose

# Motorola\*

## 2-way radio

Year in, year out Motorola 2-way radio installations number more than twice those of all other manufacturers combined. Here are but three of the many significant reasons Motorola is the leader in the 2-way radio field.



**SELECTIVITY:** Incorporated in every Motorola radio is the amazing "Permakay" Filter. This filter, encased in plastic and guaranteed for the life of the set, removes 15 nuisance tuning adjustments. The high selectivity of Motorola receivers eliminates any chance of interference from stations in adjacent channels.



**RESERVE GAIN:** To ensure against possible deterioration of tubes, 90% more gain than necessary is built into Motorola receivers! This is one more reason for the extraordinary long life of Motorola equipment.



**TRANSMITTERS:** Motorola transmitters provide for clear communications in your own system—with no interference from users on adjacent frequencies. This is ensured by the incorporation in every Motorola transmitter of an automatic *Instantaneous Deviation Control* and also by the excellent design and careful engineering of all transmitter circuits.

More man-hours are built into Motorola!



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Equipment Division

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# BOOK REVIEW



A comprehensive, 128-page, illustrated handbook on selenium and copper oxide rectifiers has been published by **Bradley Laboratories, Inc., New Haven, Conn.**, producers of dry-disc rectifiers and self-generating photoelectric cells.

Although the Bradley "Metallic Rectifier Manual" was primarily prepared as a tool for the design and development engineer, the information will be equally useful to the electronics purchasing agent.

The handbook deals with rectifier types, designs, circuitry, characteristics and applications. Many of the circuits discussed are "unorthodox," such as those concerned with modulation, current limitation and arc suppression.

Written in three basic sections, the manual includes a chapter on the history and development of both the selenium and copper oxide rectifier. A comprehensive catalog of rectifiers engineered and produced by Bradley Laboratories is included as a final section.

Major feature of the handbook is the section on applications. This chapter describes in detail such rectifier applications as cathodic protection, magnetic amplifiers, battery chargers, electro-chemical processes, electrostatic dust precipitations and d-c blocking.

Other uses described include clippers, slicers and limiters, generator voltage regulator, dynamic braking of motor, aircraft power supply system, and meter overload protection. A subsection deals with television and radio applications.

Photographs, charts, diagrams and graphs are used throughout to illustrate basic points. Although dealing in technical information required by the engineer, the manual has been written in simple and concise language.

The "Metallic Rectifier Manual," accord-

ing to Bradley, will not be allowed to grow out-of-date. As developments in the field warrant, revisions and additions will be mailed to all owners. This service is included in the purchase price of \$2.00 per copy.

## Magnetic Control Of Industrial Motors, Second Edition by Gerhart W. Heumann.

Since the first edition of this book appeared, many changes have taken place in the design of control components and systems. These are reflected in the new second edition, which has been brought completely up to date in line with recent advances in the electrical art. Expanded by about 20%, it includes much new material on adjustable voltage and regulating systems, particularly with regard to rotating and magnetic amplifiers; obsolete controller designs have been entirely eliminated.

Since the performance of control equipment is based on the desired motor performance, care has been taken to discuss the external performance characteristics of all types of industrial motors in the introductory chapters of the book. This is followed by a discussion of components and devices available to the designer. Basic circuits are introduced which obtain the necessary motor performance for industrial drives. The practical combinations of these building blocks are illustrated by an examination of widely used general purpose and special purpose controllers.

With this book in hand, you should be able to select quickly and accurately the proper type of controller for a given application. For example, the relative merits of full voltage starting and reduced voltage starting are discussed.

**Magnetic Control of Industrial Motors** is published by **John Wiley and Sons Inc.**, 440 Fourth Avenue, New York 16, N.Y. Contains 714 pages, hard covered, cost, \$9.50.

**Dielectric Materials And Applications** consists of twenty-two papers which have been edited by **Arthur R. von Hippel, Professor of Electrophysics and Director, Laboratory for Insulation Research, Massachusetts Institute of Technology.**

This unique work, drawing on the knowledge and experience of 22 experts from science and industry, is designed to provide the scientist and engineer, manufacturer and actual user of dielectrics with fundamental and practical information.

The material is so arranged that it can be used as a comprehensive review of the entire subject or for reference on specific aspects. It opens with a section on theory, establishing for the reader a firm background of language and ideas so that he can make the fullest use of the material that follows. Next, a variety of methods and techniques are described for measuring permittivity (dielectric constant and loss) and permeability over a frequency range from d-c to approximately  $3 \times 10^{10}$  cps. Detailed information with charts and tables is included to guide the reader in the selection and application of methods for his specific problems. In addition, the most recent resonance methods are discussed: microwave spectroscopy and magnetic resonance.

**Dielectric Materials and Applications** is published by **The Technology Press of the Massachusetts Institute of Technology and John Wiley and Sons Inc.**, 440 Fourth Avenue, New York 16, N.Y. Contains 438 pages, 246 illustrations, cloth bound, cost \$17.50.

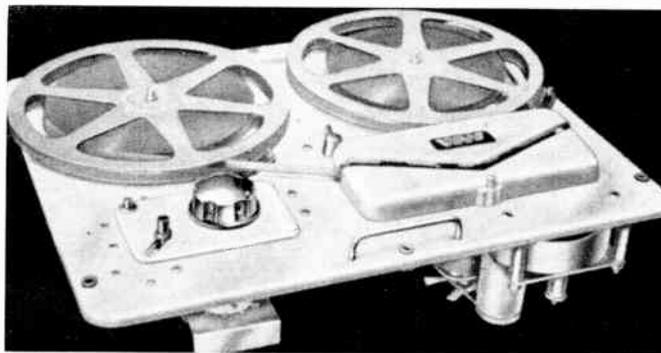
## NOW in Canada!

FOR YOUR OWN  
HIGH FIDELITY SOUND SYSTEM

### The NEW WEARITE TAPEDECK

Another example of the advanced state of the audio art in England, the Wearite tape-deck fills a long awaited need in this country. The high fidelity enthusiast can easily adapt this basic tape mechanism to his own quality sound system without duplicating power amplifier and speaker.

The Wearite tape-deck has three 60 cycle AC motors: One Hysteresis synchronous for RECORD and PLAYBACK (speed regulation: 0.5%), and two 4-pole induction motors for REWIND and FAST FORWARD.



#### OTHER FEATURES INCLUDE:

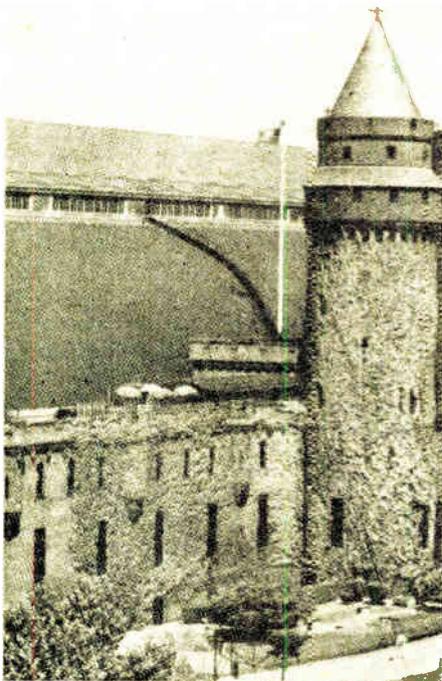
3 heads: Record-Playback, Monitor, and Erase •  
Response: 50 to 12,000 cycles • Wow and Flutter:  
less than 0.2% • Speeds:  $3\frac{3}{4}$  and  $7\frac{1}{2}$  inches/sec.  
• Capacity: 1200 feet ( $7\frac{1}{2}$ " reel) • Dual Track.

Complete with special components for  
constructing bias oscillator ..... \$225  
Tape-deck alone ..... \$195

**ASTRAL ELECTRIC COMPANY LTD.**  
44 DANFORTH ROAD TORONTO

# The CANADIAN ROOM

*Welcomes You*



Kingsbridge Armouries.

The 1955 Institute of Radio Engineers Show is expected to be the biggest show ever held by the industry. When the doors of Kingsbridge Armory and Kingsbridge Palace in New York open on March 21st, electronic engineers, designers and manufacturers from every part of the United States and Canada will pass through them to visit the exhibits.

For the convenience of the many hundreds of Canadians who will be visiting the Show but who will have little chance or likelihood of meeting their friends or business associates in the massive display buildings or among the thousands of visitors we recommend the Canadian Room in the Hotel Commodore. Its pleasant and comfortable atmosphere will be found to be conducive to either business or friendly discussion with your fellow Canadians or American business associates.

## MEMO TO CANADIANS

. . . Don't forget we'll be waiting for you here in Suites 112-114, Hotel Commodore, during your visit to the I.R.E. Show and Convention, March 21st to March 24th.

. . . Plan to meet your friends and business associates here and enjoy the congenial atmosphere of the . . . . .

## CANADIAN ROOM



**ELECTRONICS AND COMMUNICATIONS**



**AGE PUBLICATIONS LIMITED**



**TORONTO**

Send this coupon  
today . . .

I want the facts about Collins Microwave.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ PROVINCE \_\_\_\_\_

Get this booklet by return mail

and find out why Collins Microwave  
will serve you best.

You'll want all the facts in this informative booklet, but this is the story in a nutshell. Collins can do your communications and remote control jobs better because they're *specialists* in radio-electronic design and manufacture. Collins' extensive experience and success in the aviation, broadcast and amateur radio fields supply the required background and facilities to deliver microwave systems that represent the ultimate in dependability. If your plans include the use of Microwave, be sure you get assured performance and quality. Why not mail the coupon now.



**COLLINS RADIO COMPANY OF CANADA, LTD.**

74 Sparks Street, OTTAWA, ONTARIO



For more data on advertised products, use coupon, page 67

## NEW PRODUCTS

(Continued from page 69)

### ● *Milli-Microsecond Pulse Generator* Item 640

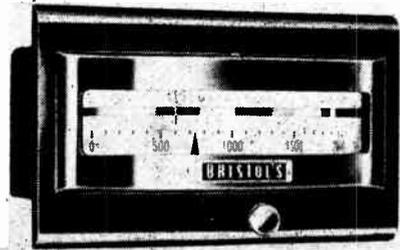
A new Milli-Microsecond Pulse Generator is now available and is called Model PG-215. It is a mercury-relay plus pulse-forming-line type of generator producing rectangular waveforms having rise, duration and decay times in the milli-microsecond range.

Practically ideal rectangular pulses at 60 or 120 per second recurrence rates are provided, with rise and decay times down to 1.2 milli-microseconds. Minimum width is 1.2 milli-microseconds, and maximum width is unlimited. The amplitude of the output pulse is variable from 0 to 35 volts with a 93 ohm load.

It also furnishes an isolated trigger signal, advanced in time with respect to the main pulse, for synchronizing associated equipment. All of the time parameters are determined by sections of standard coaxial cable supplied by the user or contained in the Model PGA-220 Width and Delay Unit available as a separate accessory, which provides 25 different sets of values of rise and decay time.

### ● *New Indicating Millivoltmeter* Item 641

A new indicating millivoltmeter which features short response time and high accuracy, has just been announced. The instrument has a newly developed high-torque jewelled millivoltmeter mechanism, with an Alnico V magnet and a self supporting coil. It is equipped with a neutralizing resistance to compensate for changes in coil resistance due to ambient temperature changes.



Accuracy of the Model 580 Indicating Millivoltmeter is 1 per cent of full scale value; minimum response time is less than six seconds for 99 per cent response.

The indicator can be used as a pyrometer, tachometer, or pH indicator, or for power consumption measurements. It can be used with any primary sensing device which is capable of supplying a millivolt signal to the indicator.

### ● *New Type Digital Decade Counters* Item 642

Two new type Digital Decade Counters, each available in three variations, for use wherever high-speed electronic counting is required has been announced.

Both types employ the printed circuit principle, thereby permitting maximum ventilation, lower operating temperature, and longer life.

The type "A" group has decades with a staircase output of voltage proportional to the count. This enables the output of the decades to be recorded on a Direct Writing Oscilloscope.

The type "B" group has decades with a four-line coded output which can be used to operate mechanical printers.

Both types are applied to Models 100, N-100, and N-101. These are high speed electronic counters which will accept input pulses at rates varying from 0 to 100,000 counts per second. For each ten impulses received at the input, one pulse is generated at the output.

# MINIATURES with Mighty Performance!

## MINIATURE RELAYS

PRODUCTION APPROVED

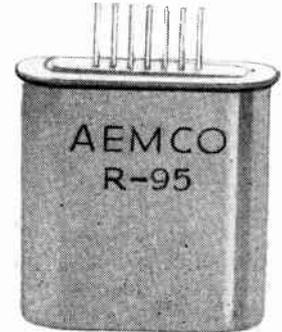
### Type R95-2029

Contact arrangements: 2 C contacts.  
Contact capacity: 1 amp. at 28 V DC non-inductive.  
Minimum life: 50,000 cycles.  
Contact material: Gold alloy.  
Coil voltage: 28 V DC.  
Duty: Continuous.  
Resistance: 775 ohms.  
Connection: 8 flexible wires 1" long.

### GENERAL SPECIFICATIONS:

Contact pressure: 12 grams min.  
Pull-in at 16 volts max. at 25° C.  
Suitable for operations from -60° to +125° C.  
Vibration and shock test: Mil-R-5757B.  
Operating time at 24 V DC: Less than 5 Milliseconds.  
Release time: Less than 2 milliseconds.

General specifications apply to Types R95-2267 and R95-2271, but these relays have different contact arrangements, capacity and leads. Contact capacity de-energized 1 mmf. energized 2.6 mmf. max.; inductance on any set of closed contacts is 0.015 UX at 25 MC.



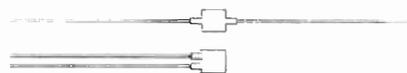
(Twice Actual Size)  
Type R-95-2029

## MINIATURE BLOWERS



The midget with the hurricane force. For cooling aircraft and electronic equipment — all places where size and weight must be considered.

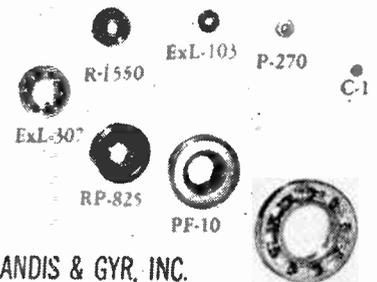
## MINIATURE CAPACITORS



This range represents today's ultimate in sub-miniature capacitors, used extensively in military applications, air-borne equipment, hearing aids, TV tuners, filters, radar, etc.

If your production involves miniature components of the above nature, we will be pleased to discuss your problems or forward descriptive literature and data on request.

## MINIATURE BEARINGS



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(Actual Size)

Today's trend toward miniaturization has resulted in the many RMB "first" such as the smallest pivot ball bearing .0434" O.D. as illustrated above (C-1). Others, the smallest radial ball, cylindrical roller, gyroscope rotor ball and gimbal ball bearings all are available to design and production engineers.

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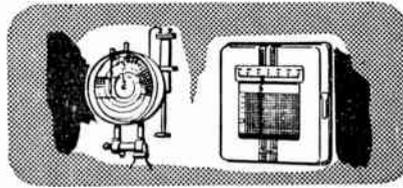
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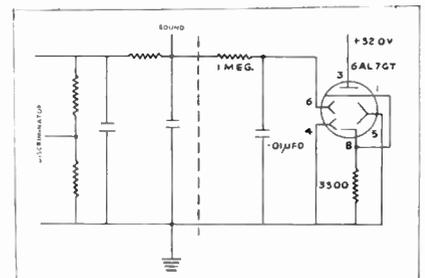
# Letters

Editor:

**Electronics and Communications:**

I read with interest your November-December issue, and would like to compliment you on your excellent coverage of an extremely wide field.

I was rather amused to note your comment, on page 48, concerning the "Invention" of a tuning eye for television receivers. It happens that about two years ago I purchased a custom TV set, a Radio Craftsman, which has just such a tuning eye. As a result, I have found it almost impossible to tune the average type of television set. Like yourself, I cannot understand why this tuning assistance has not been included in every television set, since it is an extremely



simple circuit. In case you are interested, I have attached to this letter a sketch of the circuit concerned with this tuning eye, although I imagine that by now you have probably received the same circuit or similar ones from many of your more qualified readers.

Your sincerely,  
Bruce McGregor,  
R. H. Nichols Ltd.,  
B. H. McGregor, P.Eng.,  
Supervisory Control Sales

Editor:

**Electronics and Communications:**

In your last issue you paid tribute to the CRTPB in the excellent report of the Tenth Annual Meeting of December, 1954. As the leading Canadian electronics magazine, may I ask you to continue, to the best of your reporting coverage, the publicity of the activity of this Board, our Senate of the Electronics industry in Canada.

The industry is undoubtedly sound, but the rising generation of engineers needs the assurance of top level guidance. It is from the gathered years of experience of the CRTPB that the strength of assurance can be drawn. With names like Hayes, Allard, Pounsett, Runciman, Palin, Bonneville and Reid so well known and revered in their respective fields the young engineer sees an industry working to the common good in the telecommunications field.

Particular note is made to the co-operative attitude so prevalent between the Board and Mr. G. C. W. Browne's staff. The sinking of common differences in the interest of industry unity against the tremendous problems of Dominion and world telecommunications administration is yet another achievement of CRTPB that should be communicated to the rank and file by your magazine.

There are two points which I am sure the Board must have on its agenda which I feel can be brought to notice in this letter.

Firstly, I believe that the Board should support a representative to international committees as do similar organizations from other countries. Canada is always represented at government level by first class well experienced Department of Transport personnel. It is my feeling that the electronics industry in Canada, regardless of the cost, is most unwise not to have a common representative at international electronics conferences.

Secondly, in looking around the faces in the group photograph of the Board, I wonder whether the post war users of radio communications are fully represented. Perhaps this refers not to the responsibility of the Board but to the readers of your magazine in the Police, Fire, Construction, Forestry, Taxi, Petroleum and Materials Handling fields.

May I wish the greatest of success to Mr. Boadway in 1955.

Yours very truly,  
W. H. Holroyd.

**Editor:**

**Electronics and Communications:**

Your recent editorial entitled "An Engineer's Education" (November-December, 1954 issue) is very interesting. The question regarding whether or not an engineer's training should include cultural learning, a study of the social sciences, and the humanities is asked at a very timely occasion in the affairs of men.

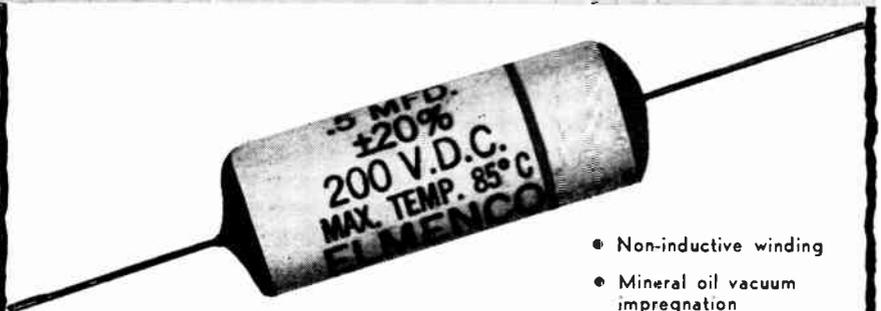
You suggest that "if a young man has exhibited the ability and intelligence to graduate from one of our present-day courses in engineering, then it follows that he has the inherent ability to acquire a knowledge of the humanities and social sciences on his own hook, after graduation". This is not necessarily so, and seems to be putting the cart before the horse. Surely a young man, *before* he begins his engineering training, should have some acquaintance with the humanities and the social sciences. Perhaps the whole of our educational system is working back-to-front, if training comes before education.

A man who has an engineering training and is able successfully to solve all the problems in his field may still not fall within the compass of

(Turn to page 77)

# a NEW standard!

The ELMENCO STEATITE-CASED PAPER TUBULAR CAPACITOR has provided the electronics industry with a new standard of performance. The combination of superb quality and dependability coupled with low cost has enabled manufacturers to upgrade their specifications. The ELMENCO PAPER TUBULAR now is the standard to which others must be compared.



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# Letters

(Continued)

the definition of an engineer. An engineer can be called a man skilled in the art and science of directing the sources of power in nature for the good use and convenience of man. If these powers are directed into channels which despoil man and nature, then there is something fundamentally wrong with our educational system.

Training, education, and wisdom are three different, although interrelated, qualities.

Definitions of education and training are given in Chamber's Technical Dictionary as follows:

Education — "The process whereby the innate intelligences and emotions of individuals are exercised so as to prepare them to accept and appreciate social organization, withstand deleterious propaganda, and, as far as possible, enable them to develop creative thoughts and actions.

Training, in so far as it meets the attainment of reliable repetition of specified processes of thought or action, is in opposition to education, which implies freedom of thought with however, acceptance of established knowledge. Modern education holds the balance between true education and training, so that the individual becomes responsible in his work and happy in his leisure."

Thus, a man can be trained and not educated, or educated and not trained. (A dog can be *trained* to do certain tricks, but this fact does not indicate that it is an educated dog, even in terms of canine education.)

Wisdom has a meaning quite different from training and education. Wisdom can be defined as "the right use of knowledge". An engineer, who should be a trained and educated person, should gain wisdom so that his skill in the art and science of directing the sources of power in nature can be devoted to the good use, service, and convenience of his fellow men. Wisdom comes from experience in human relations, in associating with our fellow men, and from analyzing the great classics of literature to understand the reasons behind human behavior. Perhaps the key to wisdom is given in the Latin root of the word "education", *educere* means "out", and *ducere*, "to lead" — to lead out (of ignorance, intolerance, and prejudice).

These are the reasons why an engineer should have a knowledge of the humanities and of the culture of mankind. What do your readers think?

Yours truly,

Basil Jackson, A.R.Ae.S.,  
Tech.M.C.A.I.



## THE NEW MODEL CRO-2

You are lucky if you own a CRO-2

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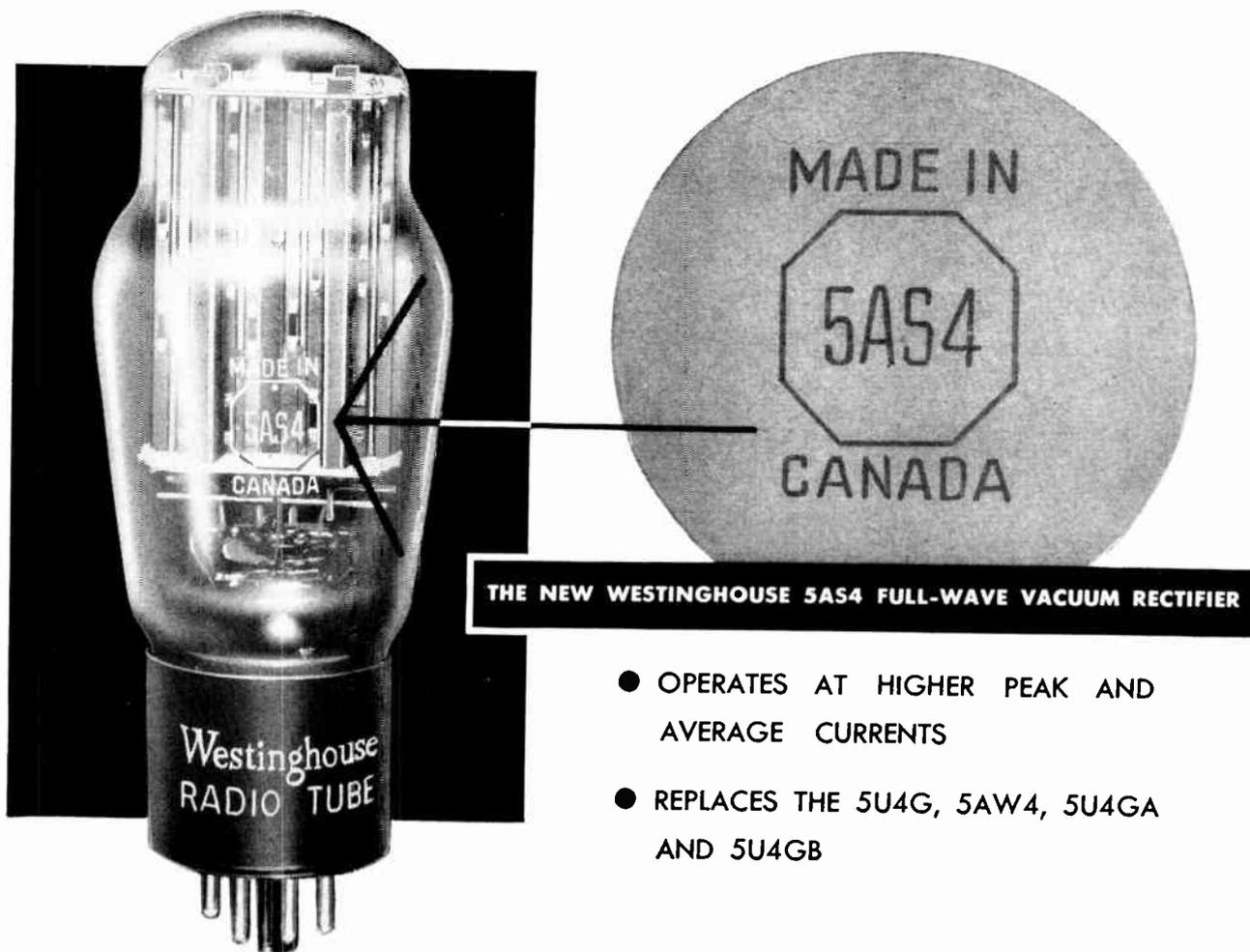
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THE NEW WESTINGHOUSE 5AS4 FULL-WAVE VACUUM RECTIFIER

- OPERATES AT HIGHER PEAK AND AVERAGE CURRENTS
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Modern, large-screen TV receivers require high DC power output. To meet this need, Canadian Westinghouse has designed the 5AS4 . . . completely engineered in Canada for the Canadian Television Industry. The Westinghouse 5AS4 has new plate, cathode and mount designs. The large mount structure, enclosed in an ST-16 envelope provides for more uniform heat distribution and permits operation of the tube at higher peak and average currents than the prototype 5U4G.

The 5AS4 is designed as a mechanical and electrical replacement for the 5U4G and for

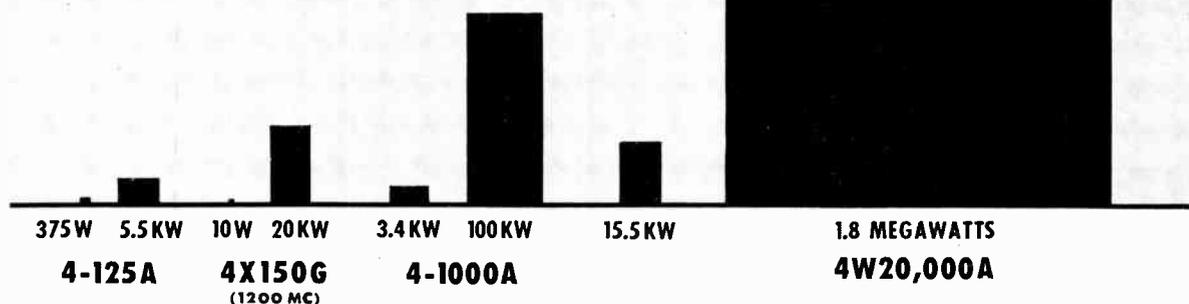
similar types such as the 5AW4, 5U4GA and 5U4GB. The Westinghouse 5AS4 has a maximum peak inverse plate voltage rating of 1550 volts and a peak plate current of 1.0 amperes/plate. Typical operation of this rectifier calls for capacitor input to filter. Under these conditions, with an AC plate-to-plate supply voltage of 600 volts rms, the 5AS4 can deliver a DC output voltage of approximately 290 volts to the filter at a DC current of 300 milliamperes.

For further information on the 5AS4, or on any tube problem, write the Tube Marketing Section, Canadian Westinghouse Company Ltd., Hamilton, Ont.

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## Top pulse performance is an Eimac Tube Feature



EXAMPLE OF HIGH POWER OUTPUT CAPABILITIES OF EIMAC TUBES  
IN TYPICAL PLATE PULSED RF AMPLIFIER OPERATION

The chart on this page illustrates the amazing power capabilities of versatile Eimac broadcast and communications tubes in typical pulse amplifier application. Incomparable pulse performance is a feature of Eimac tubes stemming from reserve filament emission and ability to handle high electrode voltages and resulting currents. This, plus clean, simple design, free of troublesome internal insulators, and advanced production techniques, produces an unmatched quality enabling Eimac tubes to give long, reliable performance in pulse RF operation and pulse modulator service.

In addition to pulse rated CW tubes, Eimac has designed and produced many tube types specifically for pulse application. The 4PR60A radial-beam pulse tetrode, pictured here, is one of this famous family. An oxide coated cathode tube,



it delivers 300kw of power output in pulse modulator service with only one kilowatt of pulse driving power. From the 100T power triode, used in the first Navy sea radar tests, to the 4W20,000A, Eimac pulse-rated tubes have filled key sockets in sea, land and air pulse operation.

Contact our Technical Services Department for your free copy of Eimac application bulletin No. 3, "Pulse Service Notes."



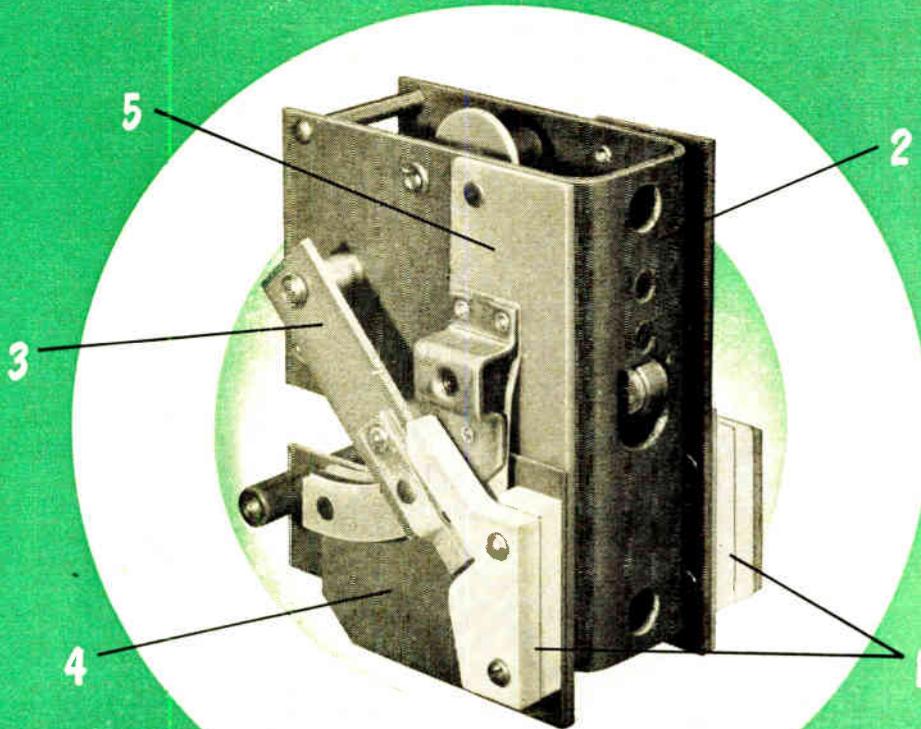
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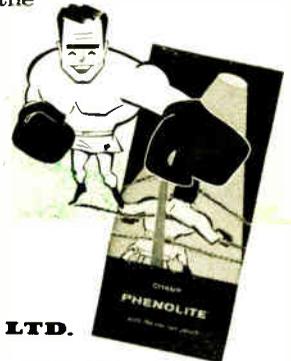
**4** The arc breaks right above this insulation plate made of a special Phenolite sandwiched between outer layers of our vulcanized fibre. Supplied: extremely high arc resistance, strength to hold adjoining parts.

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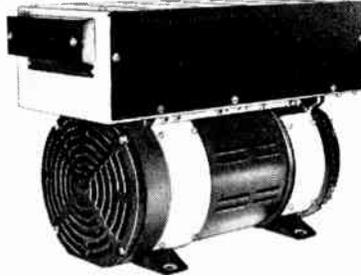
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Type	INPUT		OUTPUT			Approx. Weight Lbs.	Max. Alt. Feet	Designed to Government Part No.
	Volts	Amps.	Volts	Phase	VA Rating			
12128	27.5	1	26	1	6	2.2	35000	AN3496-1
12126	27.5	2	26	3	10	2.3	35000	N1020-SK
MG-93	27.5	12	115/200	1	100	10	65000	E-5134
				3	100			
MG-54	27.5	22	115/200	1	250	17	65000	E-5109
				3	250			
12142	27.5	22	115	1	250	13	35000	E-1617
				3	250			
12146-1	27.5	22	115	1	250	13	35000	53B6239
12146-2	27.5	22	115	3	250	13	35000	AN3532-2
MG-60	27.5	22	115	1	250	17	50000	53B6239
MG-62	27.5	22	115	3	250	17	50000	AN3532-2
32E01	27.5	35	115	1	500	26	50000	AN3533-1
				3	500			
32E00	27.5	37.5	115	1	500	34	50000	AN3534-1
		51.5		3	750			
MG-65	27.5	50	115/200	1	750	35	50000	E53805
		52		3	750			
1518 Mod. 1 & 2	27.5	105	115	1	1500	37.5	20000	—
		126		3	1800			
1518 Mod. 5	27.5	105	115	1	1500	37.5	35000	—
		126		3	1800			
MG-81	27.5	180	115/200	1	1600	61	65000	E1725
				3	1800			
32E06	27.5	150	115/200	1	2250	56	50000	E1725
		160		3	2500			
MG-70	27.5	170	115/200	1	2250	54	65000	—
				3	2500			
MG-61	27.5	170	115	1	2500	54	65000	53C6767
MG-64	27.5	170	115	3	2500	54	65000	—
32E03	27.5	160	115	1	2500	61	50000	53B6227
MG-95	27.5	150	115/200	1	2500	54	50000	E54807
		160		3	3000			
32E09	27.5	180	115/200	1	2500	60	50000	—
					3			

NOTE: D.C. Input voltage shown is a nominal value of 27.5 volts, but all units are designed to operate from 26 to 29 volts. Input amperes shown are values at 27.5 volts input.

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Rogers Majestic Electronics Ltd.	68; 69
Snelgrove Co. Ltd., C. R.	26
Stark Electronic Instruments Ltd.	78
Tel Instrument Co.	61
Telephone Mfg. Co. Ltd.	57
U.S. Engineering Co.	16
Universal Aviation Equipment Inc.	51
Wholesale Radio & Electronics	38
Wiley & Sons Inc., John	40
X-Ray & Radium Industries Ltd.	16

### POSITION WANTED

#### Qualified Graduate Engineer

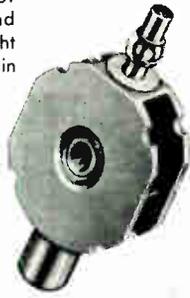
Registered professional engineer in the Province of Ontario, a member of A.I.E.E., experienced in the electronics and communications field, radar, custom electronic equipment, x-ray and control equipment, special motors, relays, special transformers, control gear and capacitors, etc., seeks change of position — preferably in the Toronto area. If interested, reply to

Box "A"  
Electronics & Communications  
31 Willcocks Street  
Toronto, Ontario

**6738 . . .** First again in the field of tube miniaturization, Bomac developed a new type TR tube designated the 6738. Designed specifically for airborne radar equipment, the 6738 is a miniaturized version of the 1B24A (another Bomac first), 1B60 and the 1B24. Size was cut in half, and weight was reduced by one fifth with no sacrifice in performance or efficiency.



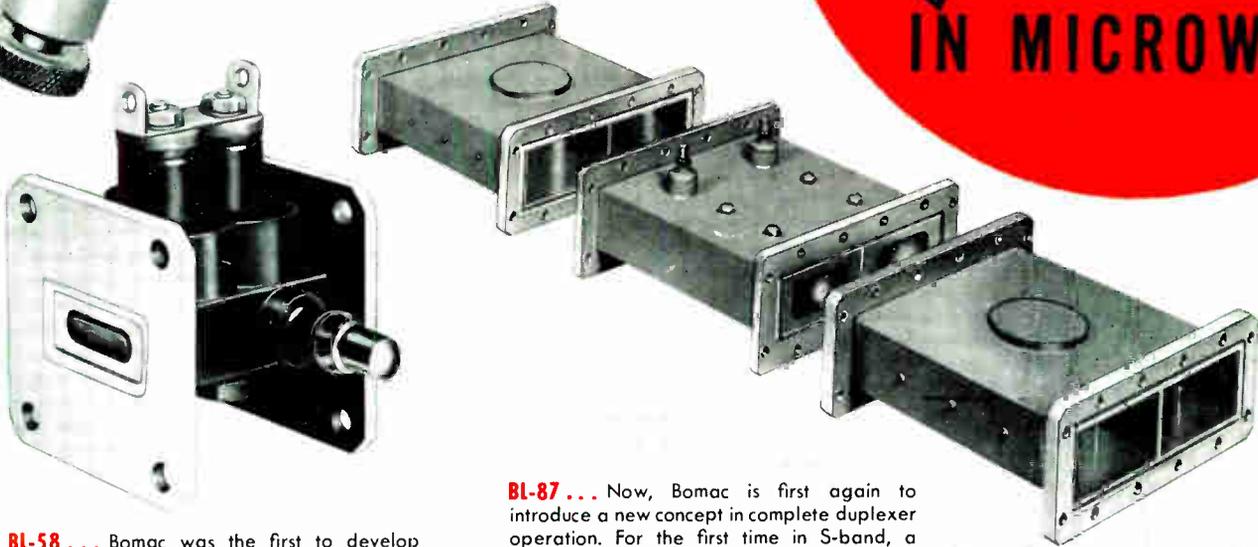
**1N23D . . .** Bomac was the first to manufacture the 1N23D silicon diode. System designers, for the first time, could obtain a diode with greatly increased sensitivity and superior electrical characteristics in relation to existing types.



**BL-25 . . .** The BL-25 TR tube, designed and developed by Bomac, was the first cell-type tube system — engineered to withstand high power levels and maintain recovery time over a long period of life. The BL-25, although originally designed for a specific piece of equipment, has proven its versatility in various applications within the industry.



# Bomac Firsts IN MICROWAVE

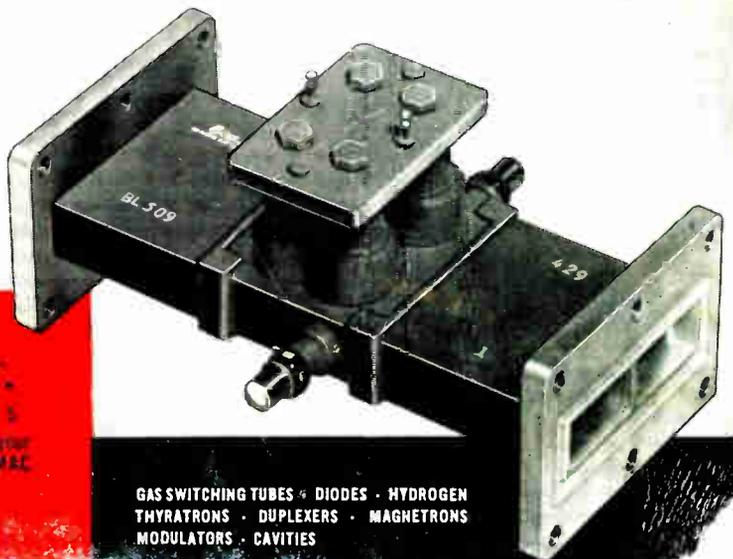


**BL-58 . . .** Bomac was the first to develop shutter tubes and integral TR-shutter combinations for continuous crystal protection. The BL-58 was the first integral TR-shutter combination developed by Bomac. With integral TR-shutter operation, bulky waveguide shutters could be eliminated at considerable savings in size and weight. This tube has now been superseded by improved models.

**BL-87 . . .** Now, Bomac is first again to introduce a new concept in complete duplexer operation. For the first time in S-band, a complete duplexer is offered to the industry. The BL-87 is a dual TR tube, complete with perfectly matched hybrids to assure maximum efficiency and long life. Systems designers can now be assured of reliable duplexer operation because Bomac's hybrids are designed specifically for their dual TR tubes. Bomac is first again in design and development of microwave tubes.

BOMAC DUAL TR DUPLEXERS			
Tube	Frequency (MC)	Tube	Frequency (MC)
6334	8490-9578	BL71	8500-9600
(BL-27)		BL78	8490-9578
BL29	9325-9425	BL87	2700-2900
BL35	15000-17000	BL507	8490-9578
BL47	9325-9425	BL600	8490-9578
BL60	5400-5900		

**BL-509 . . .** Bomac's BL-509 was the first complete duplexer offered in one compact unit. Combining a Bomac dual TR tube having integral shutters with two perfectly matched hybrid junctions in a single unit, the BL-509 provides duplexer operation and continuous crystal protection in one package. Light weight and compact, the BL-509 assures superior electrical performance and mechanical simplicity.



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World Radio History

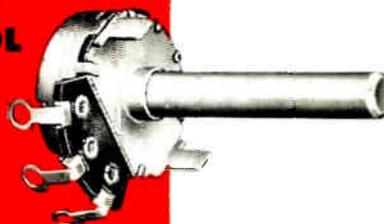
GAS SWITCHING TUBES • DIODES • HYDROGEN  
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MODULATORS • CAVITIES

# 3 Low Cost VARIABLE RESISTORS for COMPACT CIRCUITS

## COST-CUTTING TAB-MOUNTING

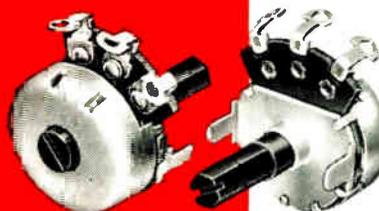
0.5 watt metal shaft type for TV picture adjustment, pre-set gain controls, etc. Tab-mounting cuts mounting time, eliminates hardware. Nine different Stackpole line switches available for this control. *Send for specifications on Type LR-5.*

### CONTROL



## TAB-MOUNTING "DOUBLE-ENDER"

Just right for rear-of-chassis or concealed front panel controls in TV receivers . . . especially in high voltage circuits. Bakelite shaft can easily be adjusted from either side of control. Measures only .894" in diameter, yet handles a full .5-watt. *Write for data on Stackpole Type LR-6.*



## MINIATURE TONE CONTROL with SPECIAL

A really versatile space-saver for midget radios, combination receivers, or amplifiers. Helps reduce the number of controls on complicated sets. U.L. Approved .5 amp., switch throws at opposite ends of control rotation—maintains full 270° shaft motion in either position. Ideal for band changing, input or bandwidth switching. *Write for details on Stackpole Type LRSS-150.*

### DP-DT SWITCH



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